User's
Manual

MW100
Data Acquisition Unit

YOKOGAWA
Yokogawa Electric Corporation

IM MW100-01E
1st Edition

Foreword

Thank you for purchasing the MW100 Data Acquisition Unit. This user's manual contains useful information about the instrument's functions, installation and wiring procedures, operating procedures, and handling precautions. To ensure correct use, please read this manual thoroughly before beginning operation. The five manuals below are also provided in addition to this manual. Read them along with this manual. As with this manual, the MW100 Viewer Software User's Manual (IM MW180-01E) and the MW100 Communication Command Manual (IM MW180-01E) are included in the accompanying CD-ROM.

Manual Title	Manual No.	Description
MW100 Data Acquisition Unit Operation Guide	IM MW100-02E	Describes concisely the handling of the MW100 Data Acquisition Unit and the basic operations of the MW100 Viewer Software.
Precautions on the Use of the MX100/MW100 Data Acquisition Unit	IM MX100-71E	Summarizes the precautions regarding the use of the MW100 Data Acquisition Unit.
MX100/MW100 Data Acquisition Unit Installation and Connection Guide	IM MX100-72E	Describes concisely the installation procedures and wiring procedures of the MW100 Data Acquisition Unit.
MW100 Viewer Software User's Manual	IM MW180-01E	Describes the functions and operations of the MW100 Viewer Software that comes standard with the MW100 main module.
MW100 Communication Command Manual	IM MW100-17E	Describes the communication command of the MW100 main module.

Notes

This manual describes the MW100 Data Acquisition Unit, style number "S2." Check the style number on the name plate of the main module (see page iv for the location of the name plate).

- The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA representative, dealer, or sales office.
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Revisions

1st Edition: June, 2005

1st Edition : June 2005 (YK)
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Safety Precautions

About This Manual

- Please pass this manual to the end user.
- Read this manual thoroughly and have a clear understanding of the product before operation.
- This manual explains the functions of the product. It does not guarantee that the product will suit a particular purpose of the user.
- Under absolutely no circumstances may the contents of this manual be transcribed or copied, in part or in whole, without permission.
- The contents of this manual are subject to change without prior notice.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors or omissions, please contact your nearest YOKOGAWA dealer.

Precautions Related to the Protection, Safety, and Alteration of the Product

- The following safety symbols are used on the product and in this manual.

*Danger. Refer to the user's manual.*This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.)

Functional ground terminal (do not use this terminal as a protective ground terminal.)

Protective grounding terminal

Alternating current

- For the protection and safe use of the product and the system controlled by it, be sure to follow the instructions and precautions on safety that are stated in this manual whenever you handle the product. Take special note that if you handle the product in a manner that violates these instructions, the protection functionality of the product may be damaged or impaired. In such cases, YOKOGAWA does not guarantee the quality, performance, function, and safety of product.
- When installing protection and/or safety circuits such as lightning protection devices and equipment for the product and control system or designing or installing separate protection and/or safety circuits for fool-proof design and fail-safe design of the processes and lines that use the product and the control system, the user should implement these using additional devices and equipment.
- If you are replacing parts or consumable items of the product, make sure to use parts specified by YOKOGAWA.
- This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.
- Do not modify this product.

WARNING

Use the Correct Power Supply

Ensure that the source voltage matches the voltage of the power supply before turning ON the power.

Connect the Protective Grounding Terminal

Make sure to connect the protective grounding to prevent electric shock before turning ON the power.

Do Not Impair the Protective Grounding

Never cut off the internal or external protective earth wire or disconnect the wiring of the protective earth terminal. Doing so invalidates the protective functions of the instrument and poses a potential shock hazard.

Do Not Operate with Defective Protective Grounding or Fuse

Do not operate the instrument if the protective earth or fuse might be defective. Make sure to check them before operation.

Do Not Use in the Presence of Flammable Liquids, Vapors, and Dust

Do not use the instrument in the presence of flammable liquids, vapors, and dust. Operation in such environments constitutes a safety hazard.

Do Not Remove Covers

The cover should be removed by YOKOGAWA's qualified personnel only. Opening the cover is dangerous, because some areas inside the instrument have high voltages.

Ground the Instrument before Making External Connections

Connect the protective grounding before connecting to the item under measurement or to an external control unit.

Avoid Damage to the Protective Structure

Operating the instrument in a manner not described in this manual may damage its protective structure.

Exemption from Responsibility

- YOKOGAWA makes no warranties regarding the product except those stated in the WARRANTY that is provided separately.
- YOKOGAWA assumes no liability to any party for any loss or damage, direct or indirect, caused by the user or any unpredictable defect of the product.

Handling Precautions of the Software

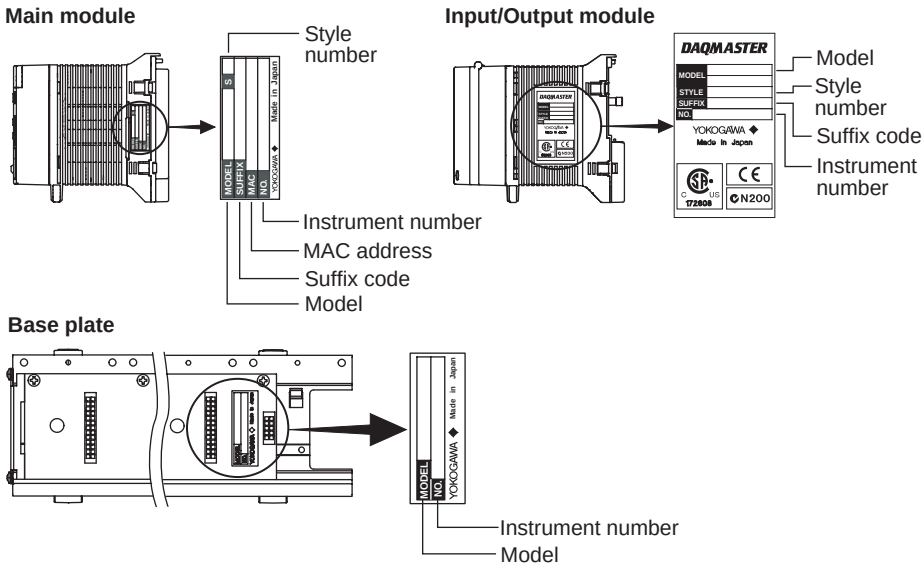
- YOKOGAWA makes no warranties regarding the software accompanying this product except those stated in the WARRANTY that is provided separately.
- Use the software on a single PC.
- You must purchase another copy of the software if you are to use the software on another PC.
- Copying the software for any purposes other than backup is strictly prohibited.
- Please store the original media containing the software in a safe place.
- Reverse engineering, such as decompiling of the software, is strictly prohibited.
- No portion of the software supplied by YOKOGAWA may be transferred, exchanged, sublet, or leased for use by any third party without prior permission by YOKOGAWA.

Checking the Contents of the Package

Unpack the box and check the contents before operating the instrument. If some of the contents are not correct, or if any items are missing or damaged, contact the dealer from whom you purchased them.

Checking the Model and Suffix Code

Check the model and suffix code on the name plate indicated in the figure below.



Note

When contacting the dealer from which you purchased the instrument, please give them the NO. (instrument number) on the name plate.

Main Module

Model	Suffix Code		Description
MW100			Main module
Manual language	-E		English (comes with an English manual)[1]
Supply voltage	-1		100 VAC-240 VAC
	-2		12 VDC-28VDC, with AC adapter[2]
	-3		12 VDC-28VDC, without AC adapter[3]
Power supply and power cord	-D		AC power: 3-pin inlet, UL/CSA Standard power cord DC power: Screw terminal, UL/CSA cable for AC adapter
	-F		AC power: 3-pin inlet, VDE Standard power cord DC power: Screw terminal, VDE cable for AC adapter
	-R		AC power: 3-pin inlet, SAA Standard power cord DC power: Screw terminal, SAA cable for AC adapter
	-Q		AC power: 3-pin inlet, BS Standard power cord DC power: Screw terminal, BS cable for AC adapter
	-H		AC power: 3-pin inlet, GB (CCC) Standard power cord DC power: Screw terminal, GB (CCC) cable for AC adapter
	-W		Screw terminal, power supply cord not included[2, 3]
Options		/C2	RS-232 communications interface[4, 5]
		/C3	RS-422A/485 communications interface[4, 5]
		/M1	MATH function[5, 6]

1 Displays Celsius or Fahrenheit, Daylight savig time can be set.
2 "W" cannot be selected with "-2."
3 "-3" can only be selected with "W"
4 "/C2" and "/C3" may not be selected together.
5 "/C2" or "/C3" must be selected to use the Modbus/RTU slave function. Also, "/M1" must be selected for use of the Modbus/RTU master function.
6 "/M1" must be selected to use the Modbus/TCP client function.

Universal Input Module

Model	Suffix Code	Option Code	Description
MX110			MX100/MW100 universal input module
Input type	-UNV		For DCV/TC/DI/3-wire RTD input
	-V4R		For DCV/DI/4-wire RTD/4-wire resistance input
Number of channels and measurement interval	-H04		4-CH, high-speed measurement (minimum measurement Interval: 10 ms)
	-M06*		6-CH, medium-speed measurement (minimum measurement interval: 100 ms)
	-M10		10-CH, medium-speed measurement (minimum measurement interval: 100 ms)
Options		/NC**	Without the clamp terminal plate

* "-M06" must be selected if "-V4R" is selected. Also, "-M06" cannot be selected if "-UNV" is selected.
** The "/NC" option can be specified only when "-M10" is specified.

Strain Input Module

Model	Suffix Code	Option Code	Description
MX112			MX100/MW100 strain input module
Input type	-B12		Internal bridge resistance: 120 Ω
	-B35		Internal bridge resistance: 350 Ω
	-NDI		NDIS connector for connections to an external bridge head
Number of channels and measurement interval	-M04		4-CH, medium-speed measurement (minimum measurement and measurement interval: 100 ms)

Digital Input Module

Model	Suffix Code	Option Code	Description
MX115			MX100/MW100 digital input module
Input type	-D05		Non-voltage contact, 5-V logic, open collector input
	-D24		24 V logic
Number of channels and measurement interval	-H10		10-CH, high-speed measurement (minimum measurement and measurement interval: 10 ms)
Options		/NC	Without the plate with the clamp terminals

Analog Output Module

Model	Suffix Code	Description
MX120		MX100/MW100 analog output module
Output type	-VAO	Voltage/current output
	-PWM	Pulse width modulation output
Number of channels and output update interval	-M08	8-CH, minimum output update interval: 100 ms

Digital Output Module

Model	Suffix Code	Description
MX125		MX100/MW100 digital output module
Output type	-MKC	A contact output
Number of channels and output update interval	-M10	10-CH, minimum output update interval: 100 ms

Base Plate

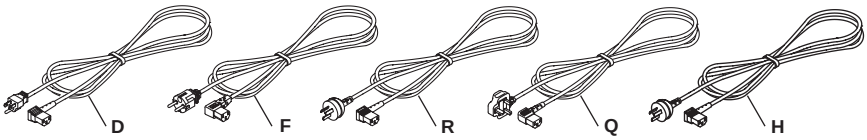
Model	Suffix Code	Description
MX150		MX100/MW100 base plate (includes two brackets for DIN rail mount)
Base type	-1 to -6	The value of the suffix code corresponds to the maximum number of input/output modules that can be installed. MX150-6 is for one main module, and six input/output modules.

Standard Accessories

The following standard accessories are supplied with the main module. Check that all contents are present and that they are undamaged.

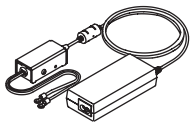
Power Cord (one of the following power cords is supplied according to the instrument's suffix codes)

UL/CSA Standard	VDE Standard	SAA Standard	BS Standard	GB Standard (complies with CCC)
A1006WD	A1009WD	A1024WD	A1054WD	A1064WD



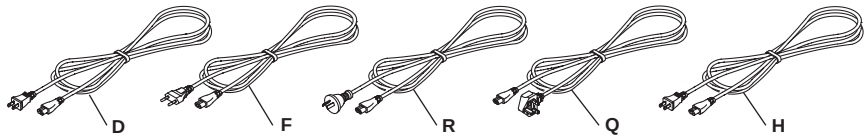
Note: Not included when screw terminals are specified for the power section (Suffix code: W).

AC adapter and Power cord*
Model: 772075



*** Power Cord for AC adapter(one of the following power cords is supplied according to the instrument's suffix codes)**

UL/CSA Standard	VDE Standard	SAA Standard	BS Standard	GB Standard (complies with CCC)



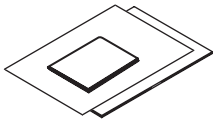
Note: Not included when screw terminals are specified for the power section (Suffix code: W).

MW100 Viewer Software
Model: MW180

MW100 Manual CD-ROM**
Part number: B8724XA

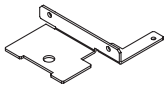
**** Contains this manual (IM MW100-01E), the MW100 Viewer Software User's Manual (IM MW180-01E) and MW100 Communication comand Manual (IM MW100-17E).**

Paper Manuals



- **MW100 Data Acquisition Unit Operation Guide (IM MW100-02E)**
- **Precautions on the Use of the MX100/MW100 Data Acquisition Unit (IM MX100-71E)**
- **MX100/MW100 Data Acquisition Unit Installation and Connection Guide (IM MX100-72E)**

Bracket for base plate
Part number: B8724EF



Screw for bracket
Part number: B9988DL

Optional Accessories (Sold Separately)

AC adapter

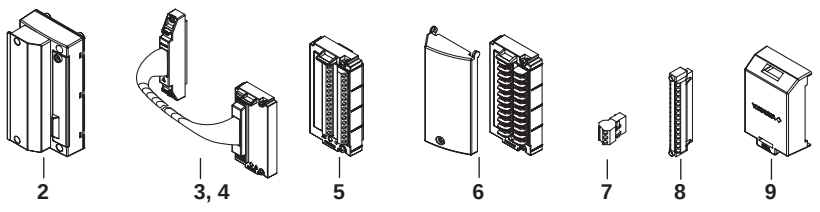
No.	Name	Model	Basic Suffix Code	Minimum Q'ty	Note
1	AC adapter	772075			
	Power supply code		-D	1	Cable for UL/CSA
			-F	1	Cable for VDE
			-R	1	Cable for SAA
			-Q	1	Cable for BS
			-H	1	Cable for GB(CCC)

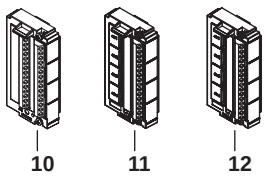
Terminals

No.	Name	Model	Minimum Q'ty	Note
2	10-CH screw terminal block (with RJC)	772061	1	Dedicated to the MX110-UNV-M10/ MX115-D05-H10/MX115-D24-H10
3	Connection cable between the input module and screw terminal block	772062-050	1	Cable length: 50 cm*
4	Connection cable between the input module and screw terminal block	772062-100	1	Cable length: 100cm*
5	Plate with clamp terminals (with RJC)	772063	1	Dedicated to the MX110-UNV-M10/ MX115-D05-H10/MX115-D24-H10
6	Screw terminal plate	772080	1	Dedicated to the MX110-UNV-M10/ MX115-D05-H10/MX115-D24-H10
7	Clamp terminal	772064	1	Dedicated to the MX110-UNV-H04
8	Clamp terminal	772065	1	Dedicated to the MX120-VAO-M08/ MX120-PWM-M08/MX125-MKC-M10
9	Connector cover	772066	1	For empty slots with no module installed
10	Plate with clamp terminals	772067	1	Dedicated to the MX110-V4R-M06
11	Plate with clamp terminals (Built in bridge: 120 Ω)	772068	1	Dedicated to the MX112-B12-M04**
12	Plate with clamp terminals (Built in bridge: 350 Ω)	772069	1	Dedicated to the MX112-B35-M04**

* 772062 is only applicable between the MX110-UNV-M10 and the screw terminal (772061), the MX115-D05-H10 and the screw terminal (772061), and the MX115-D24-H10 and the screw terminal (772061).

** 772068 is only applicable to MX112-B35-M04. 772069 is only applicable to MX112-B12-M04.





Shunt resistor

No.	Name	Model	Minimum Q'ty	Note
13	Shunt resistor (for the clamp terminal)	438920	1	Resistance: 250 Ω±0.1%
14	Shunt resistor (for the clamp terminal)	438921	1	Resistance: 100 Ω±0.1%
15	Shunt resistor	438922	1	Resistance: 10 Ω±0.1%
16	Shunt resistor	415920	1	Resistance: 250 Ω±0.1%
17	Shunt resistor	415921	1	Resistance: 100 Ω±0.1%
18	Shunt resistor	415922	1	Resistance: 10 Ω±0.1%

Memory card

No.	Name	Model	Minimum Q'ty	Note
19	Adapter for CompactFlash card	772090	1	
20	CompactFlash card	772091	1	128MB*
21	CompactFlash card	772092	1	256MB*
22	CompactFlash card	772093	1	512MB*
23	CompactFlash card	772094	1	1GB*

* Operating temperature range: -40 to 85 °C

Conventions Used in This Manual

Unit

k	Denotes 1000.
K	Denotes 1024. Examlple: 5 KB (file size)
M	Denotes 1024 K. Example: 5 MB
G	Denotes 1024 M. Example: 2 GB

Safety Markings

The following markings are used in this manual.

Refer to corresponding location on the instrument. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.

WARNING

Calls attention to actions or conditions that could cause serious injury or death to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attentions to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

Note

Calls attention to information that is important for proper operation of the instrument.

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1.1 System Overview

MW100 Data Acquisition Unit

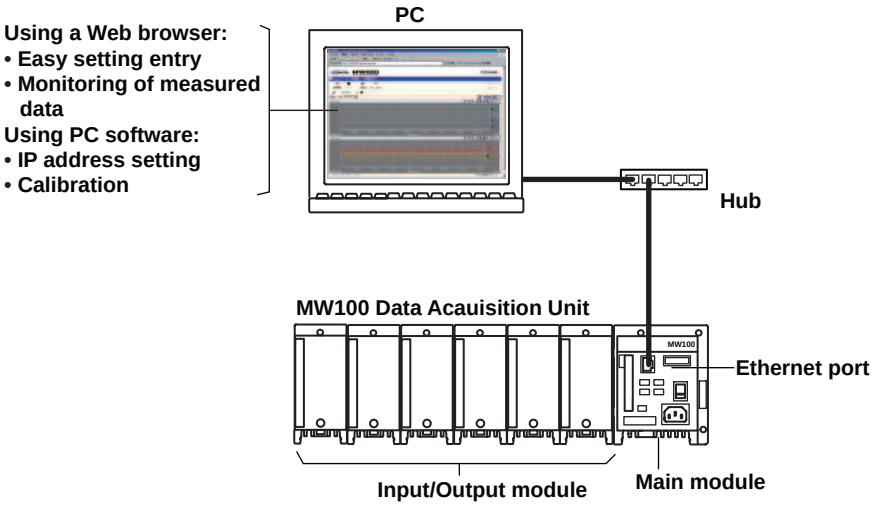
The MW100 Data Acquisition Unit consists of a main module equipped with an Ethernet port, I/O modules for input and output of signals (these are the same as those for the MX100 Data Acquisition Unit), and a base plate on which the first two items are mounted. The main module comes with a Web server function, allowing users to easily enter settings and monitor measured data from a PC using a browser. The MW100 can be used for data acquisition on site as a standalone, enabling data acquisition on up to 360 channels using the Modbus/TCP function.

System Configuration

The MW100 Data Acquisition Unit can be flexibly configured for a variety of measuring environments.

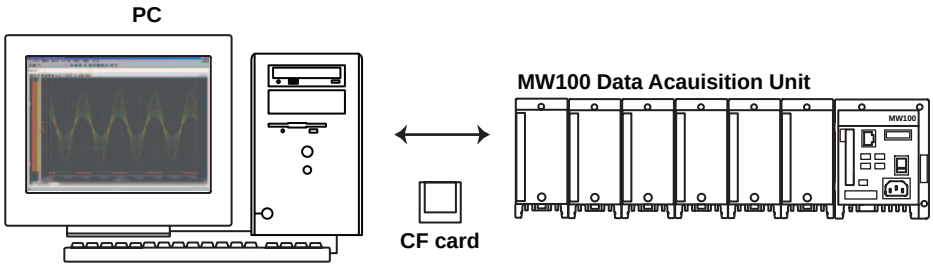
One-to-one Connection with a PC

This is an example of a system for small scale logging, setting the IP address, and other tasks.



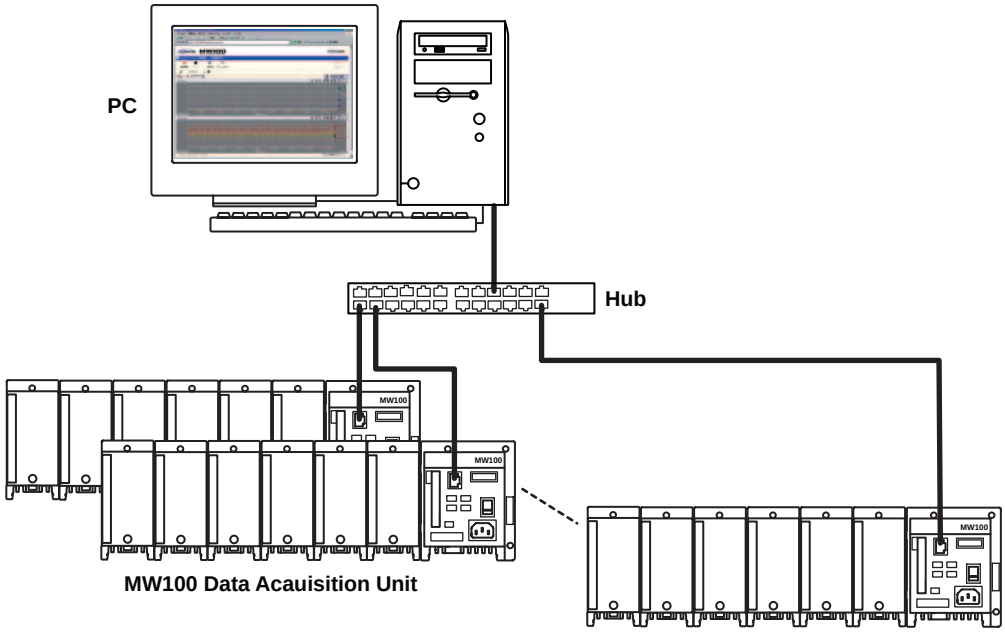
Standalone Configuration

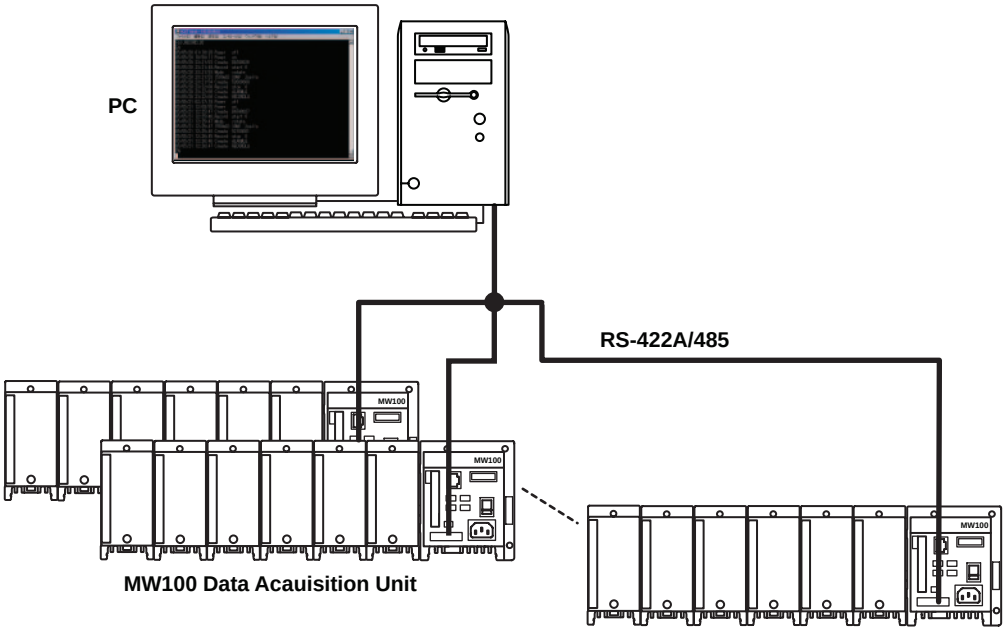
This is an example of configuration for an on-site standalone data acquisition system.



One-to-N Connection with a PC

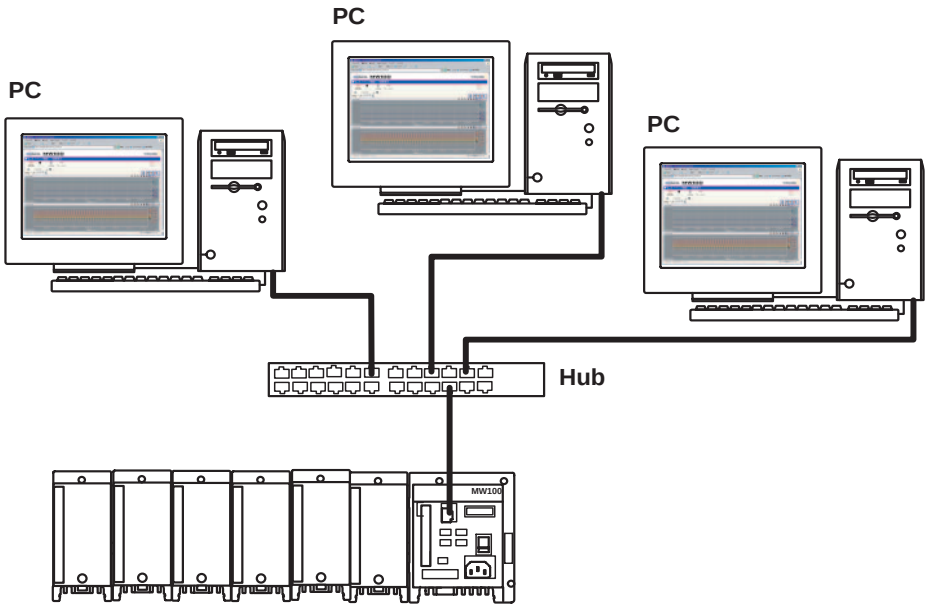
This is an example of a configuration suitable for relatively large scale data acquisition tasks. Connections can be made via Ethernet or RS-422A/485.





One-to-N Connection with the PC

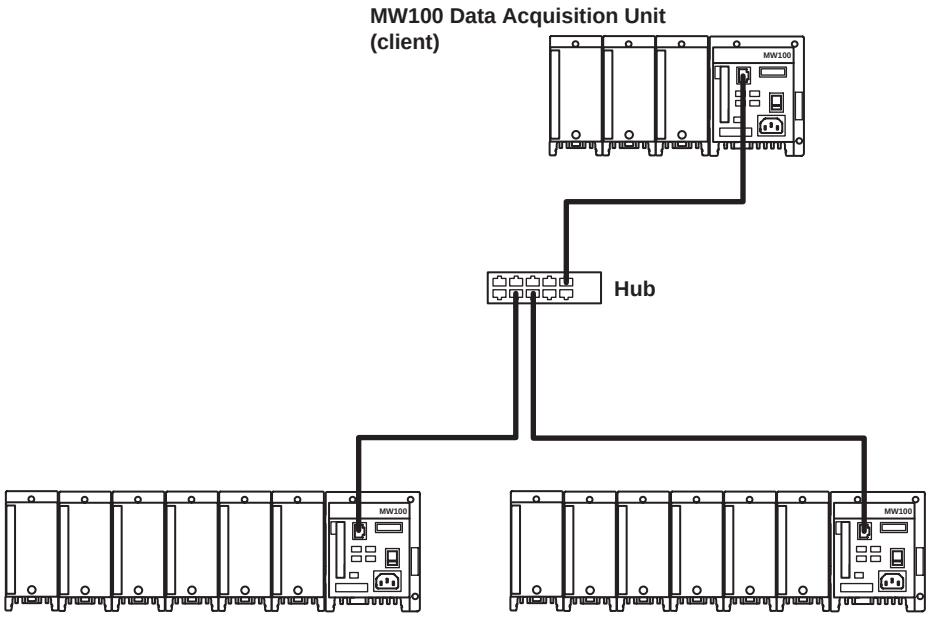
This is an example in which multiple PCs are connected to the MW100 for performing data monitoring.



MW100 Data Acquisition Unit

Connecting to Modbus Devices

This is an example of configuration of a system with connections to Modbus devices.



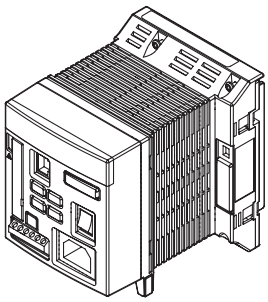
Modbus machine (server) Modbus machine (server)

Note

Using the Web monitor or other communciation functions while using the Modbus function may affect the Modbus communication response.

Main Module

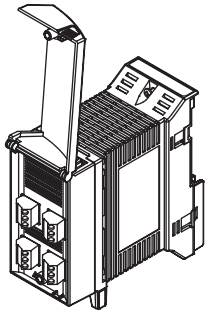
The main module is equipped with power supply connectors, a power switch, Ethernet ports, and other devices facilitating supply of power to and control of the input/output modules, and connection to networks.
It also has Start and Stop keys, meaning that since data can be saved to a CF card, data can be acquired offline. Data acquisition via serial communication is also possible by adding the RS-232 or RS-422A/485 serial communication option.



Input/Output Modules

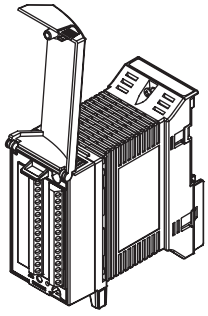
The following eleven types of modules are available. A screw terminal plate and separately installed screw terminal block (both sold separately) are available as accessories for the 10-CH Medium Speed Universal Input Module and the 10-CH High Speed Digital Input Module.

4-CH, High-Speed Universal Input Module (MX110-UNV-H04)



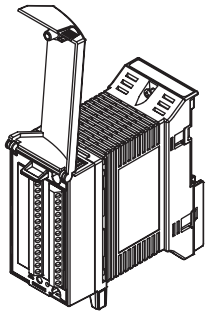
- **Minimum measurement interval: 10 ms (except 50 ms for temperature measurement**
- **Maximum number of inputs: 4 inputs**
- **Input types: DC voltage, TC, 3-wire RTD, and DI (LEVEL, contact)**

10-CH, Medium-Speed Universal Input Module (MX110-UNV-M10)



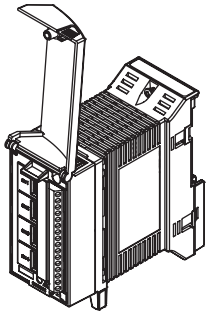
- **Minimum measurement interval: 100 ms**
- **Maximum number of inputs: 10 inputs**
- **Input types: DC voltage, TC, 3-wire RTD, and DI (LEVEL, contact)**

6-CH, Medium-Speed, Four-Wire RTD Resistance Input Module (MX110-V4R-M06)



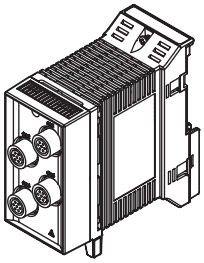
- **Minimum measurement interval: 100 ms**
- **Maximum number of inputs: 6 inputs**
- **Input types: DC voltage, 4-wire RTD, 4-wire resistance, and DI (LEVEL, contact)**

4-CH, Medium-Speed Strain Input Module (MX112-B12-M04 and MX112-B35-M04)



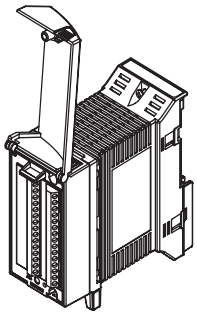
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 4 inputs
- Input system: floating balanced input (isolation between channels)

4-CH, Medium-Speed Strain Input Module (MX112-NDI-M04)



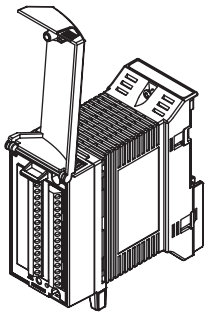
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 4 inputs
- Input system: floating balanced input (non-isolation between channels)

10-CH, High-Speed Digital Input Module (MX115-D05-H10)



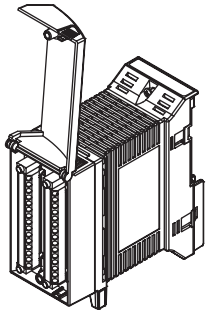
- Minimum measurement interval: 100 ms
- Maximum number of inputs: 10 inputs
- Input types: DI (non-voltage contact, open collector, 5-V logic)

10-CH, High-Speed Digital Input Module (MX115-D24-H10)



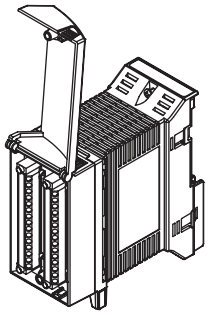
- Minimum measurement interval: 10 ms
- Maximum number of inputs: 10 inputs
- Input types: DI (24-V logic)

8-CH, Medium-Speed Analog Output Module (MX120-VAO-M08)



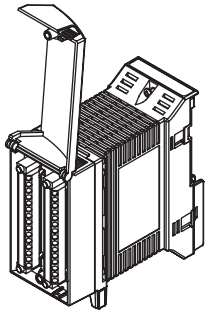
- **Output update interval: 100 ms (shortest)**
- **Maximum number of inputs: 8 outputs**
- **Output type: DC voltage, DC current**

8-CH, Medium-Speed PWM Output Module (MX120-PWM-M08)



- **Output update interval: 100 ms (shortest)**
- **Maximum number of inputs: 8 outputs**
- **Output type: PWM**

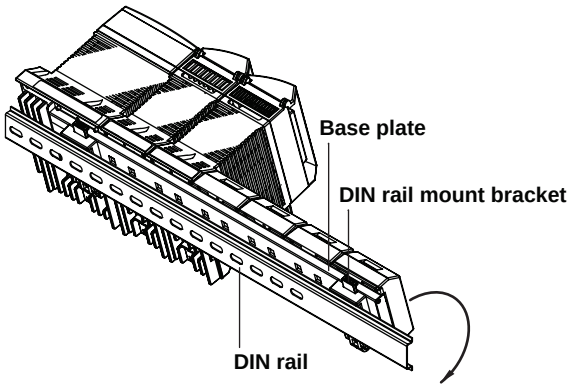
10-CH, Medium-Speed Digital Output Module (MX125-MKC-M10)



- **Output update interval: 100 ms (shortest)**
- **Maximum number of outputs: 10 outputs**
- **Output type: A contact (SPST)**

Base Plate

The base plate is equipped with connectors for connecting the main module and input/output modules. There are six types of base plates available (connecting from one to six input/output modules). By attaching DIN rail mounting brackets to the base plate, you can rack-mount or panel-mount the MW100 main unit.

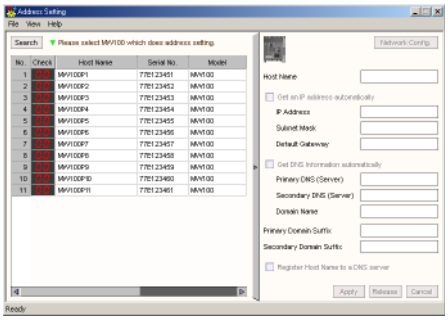


PC Software

The MW100 Data Acquisition Unit comes with the MW100 Viewer software program that allows users to view measured data acquired by the MW100. MW100 Viewer consists of the three software components described below. For a detailed description of the functions of these software components, see the MW100 Viewer software user's manual (IM MW180-01E).

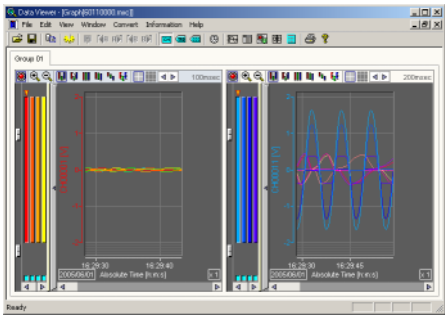
Address Setting Software

Sets the IP address on the MW100. This software is used when setting an IP address for the first time, or if the current IP address needs to be changed.



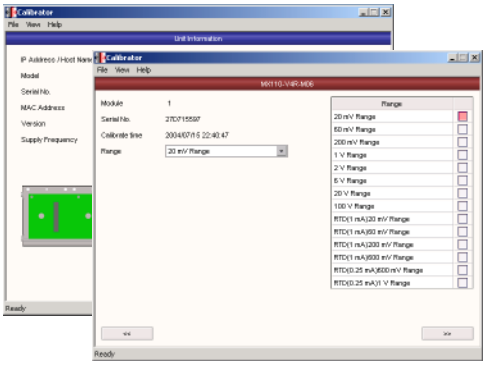
Viewer Software

Enables you to (1) display measured and computed data that has been stored, (2) read values and perform computation over an area using cursors, and (3) convert the measured and computed data into various file formats such as Excel.



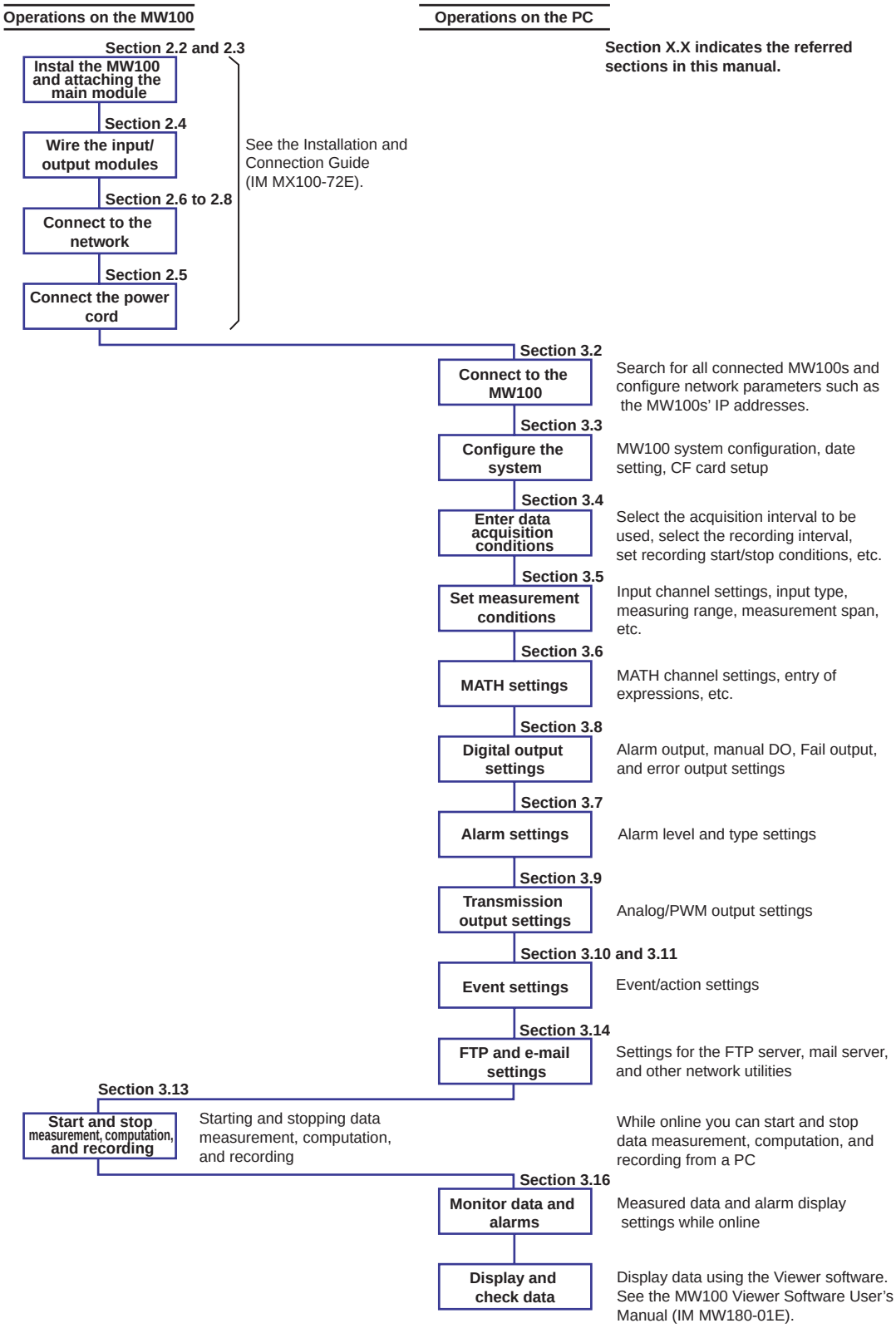
Calibration Software

This software is used to calibrate the input/output modules connected to the MW100.



1.2 MW100 Operation Guide

The figure below shows the general flow of operation when the MW100 is installed initially.


Operations on the MW100
Operations on the PC
Section X.X indicates the referred sections in this manual.
Section 2.2 and 2.3
Instal the MW100 and attaching the main module
Section 2.4
Wire the input/ output modules
Section 2.6 to 2.8
Connect to the network
Section 2.5
Connect the power cord
See the Installation and Connection Guide (IM MX100-72E).
Section 3.2
Connect to the MW100
Search for all connected MW100s and configure network parameters such as the MW100s' IP addresses.
Section 3.3
Configure the system
MW100 system configuration, date setting, CF card setup
Section 3.4
Enter data acquisition conditions
Select the acquisition interval to be used, select the recording interval, set recording start/stop conditions, etc.
Section 3.5
Set measurement conditions
Input channel settings, input type, measuring range, measurement span, etc.
Section 3.6
MATH settings
MATH channel settings, entry of expressions, etc.
Section 3.8
Digital output settings
Alarm output, manual DO, Fail output, and error output settings
Section 3.7
Alarm settings
Alarm level and type settings
Section 3.9
Transmission output settings
Analog/PWM output settings
Section 3.10 and 3.11
Event settings
Event/action settings
Section 3.14
FTP and e-mail settings
Settings for the FTP server, mail server, and other network utilities
Section 3.13
Start and stop measurement, computation, and recording
Starting and stopping data measurement, computation, and recording
While online you can start and stop data measurement, computation, and recording from a PC
Section 3.16
Monitor data and alarms
Measured data and alarm display settings while online
Display and check data
Display data using the Viewer software. See the MW100 Viewer Software User's Manual (IM MW180-01E).

1.3 Functions of the Main Module

The main module is the central component of the MW100 Data Acquisition Unit.

Names and Functions of Parts

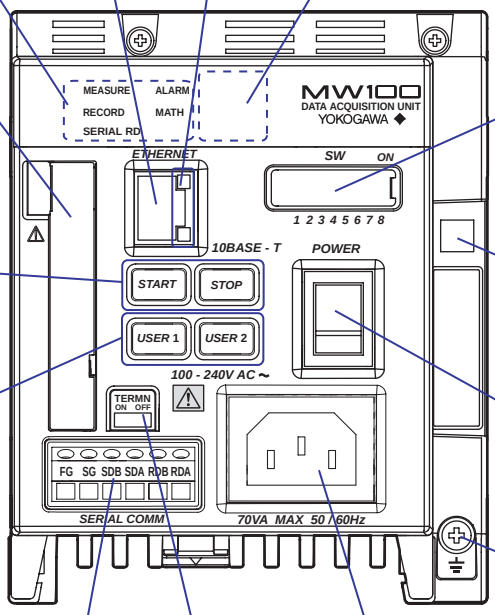
Ethernet port
Used for main unit settings and network connections (see 2.6, “Connecting an Ethernet Cable,” or 3.2, “Connecting to the MW100.”)

Communication status LED
Check the communication status
Top: LINK LED
Illuminates orange when ready for communication
Bottom: ACT LED
Illuminates green when packets are sent/received

Status indicator*
The operational status of the instrument is indicated by the illumination of the LED.

7-segment LED
Displays the operational status of the MW100 (see “Displays” in this section, or section 4.1, “7-Segment LED Error Display”).

CF card slot
Insert the CF card to save data and perform other tasks (see section 2.11, “Handling of the CF Card,” or 3.3, “System Settings”).



Dip switch 1
Used to initialize settings, and for other purposes (see, “Switches and Keys” in this section)

Start/Stop keys
Start and stop measurement, computation, and recording (seesection 3.13, “Starting and Stopping Measurement, Computation, and Recording”).

Dip switch 2
Not used.

User function key
Assign functions to the keys (see, “Switches and Keys” in this section)

Power switch
Turns the power to the MW100 main unit ON and OFF

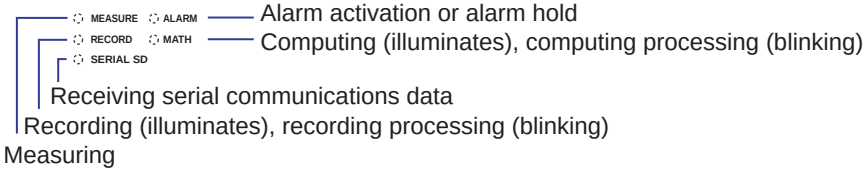
Functional ground terminal

Power supply inlet
Connect the accessory power supply cord This is listed as a screw terminal in the power supply specifications.

RS-422A/485 connector (/C3 option)
Depending on installed options, the connector may or may not be available, or it may be an RS-232 connector (/C2 option, see “Communication Specifications” in this section)

Terminator switch (/C3 option)
Turns the terminator ON and OFF

***Status indicators**
Illuminate in the following situations



Switches and Keys

The MW100 has the following switches and keys. Some are included with options.

- Start and Stop keys
- User function key 1
- User function key 2
- Dip switch 1
- Dip switch 2
- Terminator switch (/C3 option)
- Power switch

User Function Keys

Actions set up using the Event/Action function can be executed by pressing the user function keys on the front panel of the MW100.
The keys are assigned as follows by default.

Key	Display	Action
User function key 1	USER1	Write to setting values file
User function key 2	USER2	Load setting values file

Dip Switch 1

Used to initialize the MW100 settings and for other functions.

- Normal operation

- Initialization of IP addresses and other settings

- Fixed IP address (192.168.0.10)

Dip Switch 2

Turn all switches ON for normal operation. If the switches are set differently, the instrument may not function correctly.

Key Lock Function

You can apply a lock to the functions of the Start, Stop, and user function keys. The lock prevents inadvertent execution of functions.

Connectors

The MW100 can come with the following connectors. The actually-installed connectors depend on the power supply input section specifications and options.

- Ethernet
- RS-422A/485 connector (/C3 option)
- RS-232 connector (/C2 option)
- CF card slot
- Power supply inlet (power supply input section specification: -1M)
- Power supply screw terminals (power supply input section specification: -1W, -2M, -3W)

Displays

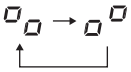
The MW100 indicates its operating conditions with the following displays.

- 7-segment LED
- Status indicators
- Communication status LED

7-Segment LED

Displays the MW100 Data Acquisition Unit's unit number, operation status, end of operation, and errors.

- Unit Number Display
  Unit numbers can be set from 00 to 89. 00 - 89 is displayed.
- Display of the Self-Test Operation on Startup
  When the power is turned ON the setting of dip switch 1 is displayed 00 followed by the operation preparation status 88. , and then a self check is performed. While the self check is in progress, the following displays are repeated.



- Key Lock Status
  A key lock function is included for preventing accidental manipulation of the MW100 front panel keys. The key lock status is indicated by a dot at the bottom of the unit number. The example shown is for a unit of number 00.

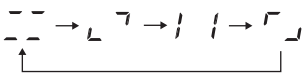
• Keylock release

Unit number

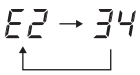
• Keylock

Unit number and dot

- In-Progress Display
  The following displays cycle while the CF card is being accessed or while calibration is being performed.



- Operation Error Display
  In error Exxx (where xxx is a three-digit number), the code is divided into two parts which are displayed alternately. In the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.
  Example: Error code E234



  Up to three error codes are saved.
  For the contents of error codes and their meanings, see section 4.1, "Errors Displayed on the 7-Segment LED and Corrective Actions." You can clear one error that is displayed by pressing the Stop key.

Measurement

Measured data sampled at certain intervals is acquired by the various input modules. Acquired data is saved to the CF card.
In addition, the main module receives output commands sent from the PC as necessary and generates signal output instructions to the output modules.

Measurement Intervals

- Synchronization between modules
  If set to the same measurement interval, measurements made by input modules in the same acquisition unit are synchronized.
- Synchronization between channels
  On the 4-CH, High-Speed Universal Input Module and 10-CH High-Speed Digital Input Module, measurement is synchronized between channels.
  On the 10-CH, Medium-Speed Universal Input Module, Six-Channel Medium-Speed Four-Wire RTD Resistance Input Module, and 4-CH, High-Speed Digital Input Module, since measurement occurs sequentially by channel, it is not synchronized between channels (it can be said to be synchronized within measurement intervals).

Multi interval

Measurement Groups

Three measurement intervals can be set, and measurement channels can be assigned to each interval. There is a particular order in which measurement intervals can be set to measurement groups. For more information, see section 3.4, “Setting Acquisition Conditions for Measured and Computed Data.”

Filters

A first-order lag filter is available. You can select a time constant (time until 63.2% of the output value is reached) corresponding to the measurement interval indicated in the equation below.

Time constant = measurement interval × N (where N = 5, 10, 20, 25, 40, 50, or 100)

For details, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

MATH

Differential computation between channels and linear scaling are possible. Linear scaling converts the measured values for a specific purpose (scaled values) using the following equation.

$$\text{Scale value} = \frac{(X - SP_{min}) \cdot (SC_{max} - SC_{min})}{SP_{max} - SP_{min}} + SC_{min}$$

X: Measured value
SP_{max}: Specified span maximum
SP_{min}: Specified span minimum
SC_{max}: Specified scale maximum
SC_{min}: Specified scale minimum

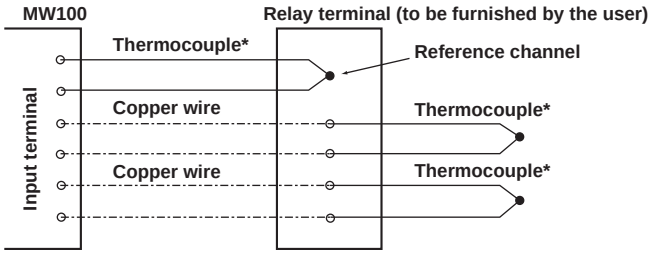
MATH Types	Notation
Differential computation between channels	DELTA
Linear scaling	SCALE

MATH (/M1 Option)

Expressions using measured and computed data as variables can be entered and executed on channels dedicated for computation, and the results can be displayed and saved. Computations are executed every measurement interval (shortest interval is 100 ms).
For details, see section 1.13, “MATH Functions (/M1 Option).”

Remote RJC (RRJC)

When the item to be measured is located at a great distance, you can setup relay terminals near the item, measure between the relay terminal and the input terminal of the universal input module (reference channel) using thermocouples, and use the resultant value as the reference junction compensation of the temperature measurement. By connecting the relay terminal and the input terminal of the universal input module using copper wires and connecting the item to be measured and the relay terminal using thermocouples, you can make temperature measurements without having to use large quantities of high-cost thermocouples.



*** Use the same type of thermocouples.**

Burnout

When the input mode is set to thermocouple (TC), you can set the burnout detection behavior. Measured values become “range over” during detection.

Detection Behavior	Notation
No detection	OFF
Measured values fixed at +range over	UP
Measured values fixed at –range over	DOWN

Alarms

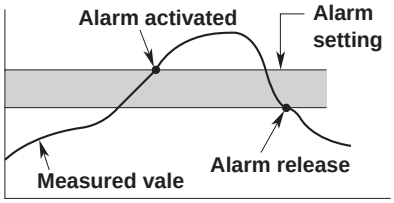
The main module compares the measured values against preset alarm values and outputs alarm signals based on the result from the digital output module. The following four types of alarms can be output.

Type	Notation	Actions
Upper limit alarm	H	Generates an alarm when the measured value exceeds the alarm value.
Lower limit alarm	L	Generates an alarm when the measured value falls below the alarm value.
Differential upper limit alarm (during differential computation)	DH	Generates an alarm when the difference between the measured values of two alarms exceeds the alarm value.
Differential lower limit alarm (during differential computation)	DL	Generates an alarm when the difference between the measured values of two alarms falls below the alarm value.
High limit on rate-of-change alarm	RH	Generates and alarm when the rate of change in rising measured values exceeds the alarm value.
Low limit on rate-of-change alarm	RL	Generates and alarm when the rate of change in falling measured values falls below the alarm xvalue.

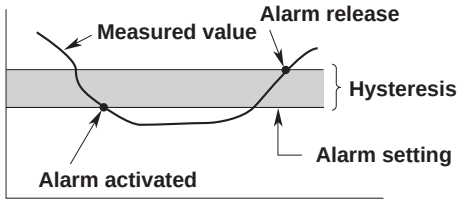
Alarm Value Hysteresis

You can set a width (hysteresis) to the values used to activate and release alarms. Alarm hysteresis can prevent frequent activation and release of alarms when the measured value is unstable around the alarm value.

Upper limit alarm



Lower limit alarm



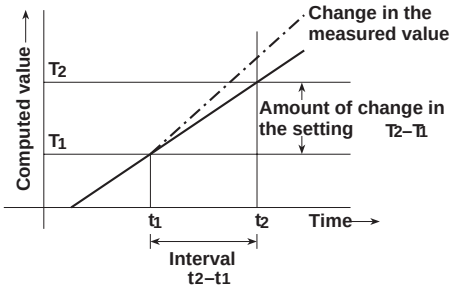
Alarm Output Timing

The output interval is 100 ms. Therefore, when the measurement interval is 10 ms or 50 ms, the alarm output data is accumulated over 100-ms intervals and output at 100-ms intervals based on the accumulated data.

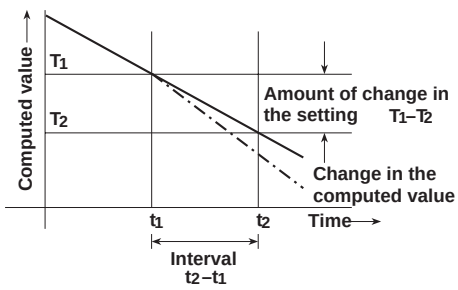
Rate of Change Upper Limit / Lower Limit Alarm

The rate of change of the measured values is checked over the rate-of-change detection interval. An alarm occurs if the rate of change of the measured value in the rising direction exceeds the specified value.

High limit on rate-of-change alarm



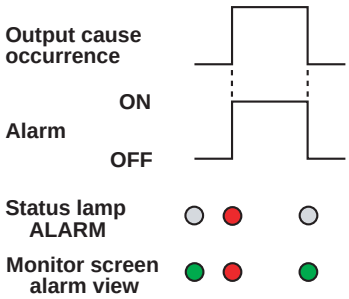
Low limit on rate-of-change alarm



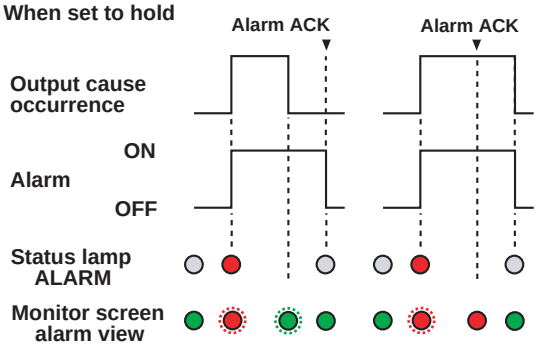
Alarm Hold/Non-Hold

You can select whether, when factors resulting in output cease to exist, alarms are cleared when the output factors are cleared, or alarms are held for their full duration (alarm ACK*).

• When set to non-hold



• When set to hold



* By clicking the Alarm ACK button in the browser's monitoring screen or by sending an equivalent communication command.

Operation Modes and Statuses

The MW100 has a Setting mode in which input ranges and other settings can be entered, and a Measurement mode in which data acquisition is performed. The mode switches depending on the measurement item of the status information.

Mode	Status Info Measurement	Description
Setting mode	STOP	For entering range, system, communication, and display settings
Measurement mode	START	For data monitoring, computation, and recording

* The instrument must be in measurement mode in order for the status of computation and recording to be START.

Tag Strings

You can select whether to display tags or channel numbers on all channels.

Communication Specifications

The MW100 can communicate with external devices using its Ethernet or serial communication port.

Login Function

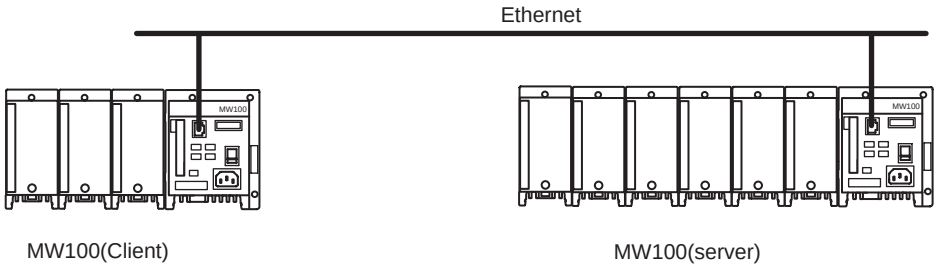
This function ensures that only previously registered users can obtain access when communicating with the MW100.
For instructions, see section 3.2, “Connecting to the MW100.” There are two levels of user access rights as follows:

Level	Notation	Description
Administrator privileges	ADMIN	All functions are available.
User privileges	USER	Measured/computed data, settings, log information, alarm summaries, and status information can be obtained. Administrator privileges required to switch operation modes, start/stop computation and recording, or change settings such as the measuring range.

Ethernet Communication

Using 10Base-T media, the MW100 supports the FTP, SNTP, DHCP, DNS, HTTP, Modbus/TCP, SMTP, and MW-specific protocols.

- Web Server Function
  MW100 settings and data can be monitored from a PC using a browser.
- DHCP Client Function
  The IP address can be automatically obtained from the DHCP server.
- SNTP Function
  Acting as a client, the MW can obtain time information from the specified SNTP server when the power is turned ON. When acting as the server, the unit can provide time information to other MW100s connected to the network.
- FTP Function
  As a client, the MW can send acquired data files to an FTP server. Two recipient locations can be specified. When acting as the server, the MW can transfer or delete files according to commands from a PC.
- E-Mail Function
  Alarm occurrences and creation of data files can be notified via e-mail. Two recipients locations can be specified.
- Modbus Client Function(/M1 option)
  The MW100 can connect to a Modbus server device and load measured data. Using Modbus commands, the MW100 can load data from the Modbus server at regular intervals. Loaded data are assigned to the communication input channels (C001-C300) of the MATH function (/M1 option). Up to ten Modbus servers can be registered.

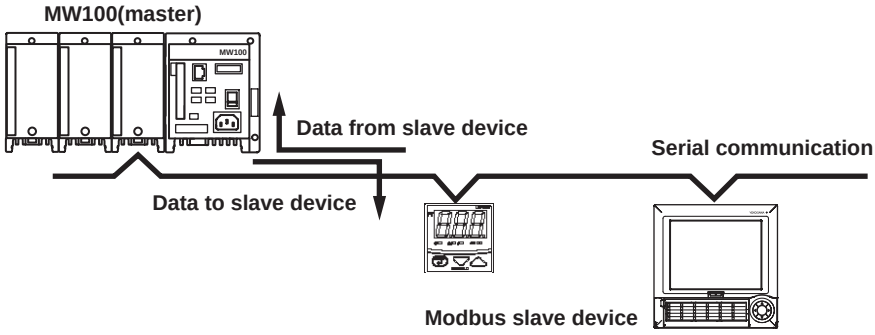


- Modbus Server Function (See Figure on Previous Page)
  Modbus clients connect to an MW100 acting as the Modbus Server, and read from or write to its internal registers.
  Measured data and alarm statuses from measurement channels, measured data and alarm statuses from MATH channels, data from communication input channels, and time information are stored in the MW100's registers. Up to four clients can be connected simultaneously.

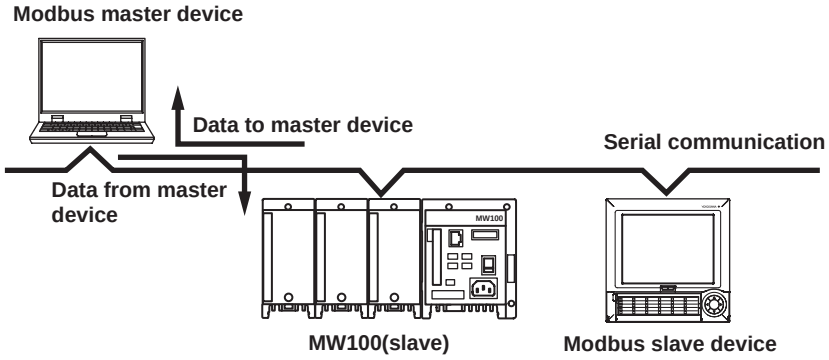
RS-422A/485 Communication (/C3 Option)

In a multi-drop, four-wire configuration, up to thirty-two units can be connected. A dedicated protocol and the ModbusRTU protocol are supported.

- Using communication commands, you can send and receive settings, and measured and computed values.
- Modbus Master Function
  The MW100 can connect to a Modbus slave device and load measured data. The operation is the same as the Modbus client function. Target devices (Modbus slaves) are identified with addresses.



- Modbus Slave Function
  Modbus master devices can connect to other MW100s acting as Modbus slaves and read from or write to their internal registers. The MW100 registers are the same as those for the Modbus server function.



For instructions on connections, see section 2.7, "Connections Using the RS-422A/485 Interface (/C3 Option)."

RS-232 Communication (/C2 Option)

This is a point-to-point system. A dedicated protocol and the Modbus/RTU protocol are supported.

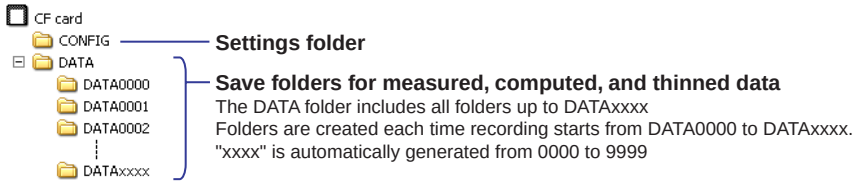
- Using communication commands, you can send and receive settings, and measured and computed values.
- The MW100 operates as the Modbus master or slave. For information about the operation, see "RS-422A/485 Communications (/C3 Option)."

For instructions on connections, see section 2.8, "Interface Connections (/C2 Option)."

Saving Data to the CF Card

Save Location

Measured/computed data, thinned data, data acquisition logs, alarm summaries, and settings can be saved on the CF card.
These files are saved in the folder structure shown in the figure.



Saving Measured Data and Computed Data

Files can be created for every measurement group. An individual file is created for computed data. For each measurement group, you can select whether or not to perform the save operation.
The table below shows the approximate interval over which data can be saved to the CF card when one measurement interval is used.

Save Channel	Measurement Interval	Capacity of the CF Card	
		128 MB	512 MB
10 ch	10 ms	8.8 hours	35.3 hours
	100 ms	3.7 days	14.8 days
	1 s	37 days	148 days

Saving Thinned Data

Data is saved at a specified thinning interval. Thinning time:
4, 5, 10, 20, or 30 seconds, or 1, 2, 3, 4, 5, 10, 20, or 30 minutes, or 1 hour.
Select a thinning time from the above choices.

Recording Operation

The following three recording operations are available for measured, computed, and thinned data.

Mode	Display	Operation
Single	SINGLE	One file of a specified size is created on the CF card, then recording stops.
Full stop	FULLSTOP	Files of the specified size are created until the capacity of the card is reached, then writing to the card stops.
Rotate	ROTATE	Files of the specified size are created until the capacity of the card is reached, then if the capacity is exceeded, new data is written over the oldest data, and the process continues.

Recording Start Operation

The following three operations for starting of recording to the CF card are available.

Type	Notation	Operation
None	OFF	Does not record.
Direct	DIRECT	Starts recording at the same time as recording to the internal memory starts
Trigger	TRIGGER	Enters trigger wait mode when recording starts. Recording is started after an event occurs.

* There are no triggers for recording of thinned data.

Pretrigger Function

When selecting Trigger, a pre-trigger can be set in units of ten percent of the data length. Writing starts simultaneously with recording, and after a trigger event occurs, the data remaining after removal of the pretrigger data is written.

Saving Settings

MW100 setting values can be saved. The contents that are saved are as follows:

- Range, alarm, and MATH related settings
- Media related settings
- Communication related settings
- Other settings

However, when settings are loaded onto the MW100, the IP address, subnet mask, default gateway, host name, and domain name are not loaded.

Format

Initializes the CF Card.

Daylight saving time

The internal clock is updated every specified month, week, day, and time.

Timer

The Event/Action function can be started according to timer settings.
The following two timers are available.

Type	Notation	Description
Relative Time Timer	RELATIVE	Time up occurs at the specified time interval
Absolute Time Timer	ABSOLUTE	Time up occurs at a time interval after a specified reference time**

* Operation upon power failure differs. For details, see chapter 5, “Specifications.”
** Also valid prior to the reference time.

Match Time

The Event/Action function can be started according to the match time setting.
The following three match times are available.

Type	Notation	Description
Monthly	MONTH	Time up occurs every month on specified date and time (hr and min)
Weekly	WEEK	Time up occurs every every week on the specified day of the week and time (hr and min)
Daily	DAY	Time up occurs every day at the specified time (hr and min)

* Conditions can be set for no operation. For details, see chapter 5, “Specifications.”
** For information about operation during power failures and time changes, see chapter 5, “Specifications.”

Event/Action Function

By linking the Event function and Action function, you can control the operations of the main unit. The following types of events are available. Some items may not be available depending on the options installed.

Event Type	Notation	Start Specification
Contact input	DI	Channel number
Alarm occurrence	ALARM	
Alarm on specified channel	ALARM_CH	Channel number, alarm level number
Recording start	MEMORY	
Relay action	RELAY	Relay number
Timer event occurrence	TIMER	Timer number
Match time event occurrence	MATCH_TIME	Match time number
User function key	USER_KEY	Keys number

The following Actions are available. The items that can be set differ according to the events and event detection method.

Action	Notation	Detection Method	
		Edge	Level
Recording start*	MEMORY_START	○	○
Recording stop*	MEMORY_STOP	○	
Computation start	MATH_START	○	○
Computation stop	MATH_STOP	○	
Clear computed values	MATH_CLEAR	○	
Reset computed values	MATH_RESET	○	
Reset MATH on specified MATH group number (Gr.1-7)	MATH_RST_GR1 MATH_RST_GR2 MATH_RST_GR3 MATH_RST_GR4 MATH_RST_GR5 MATH_RST_GR6 MATH_RST_GR7	○	
Trigger occurrence on specified number	TRIGGER1 TRIGGER2 TRIGGER3	○	
Alarm ACK	ALARM_ACK	○	
Flag	FLAG	○	○
Reset timer of specified number (1-6)	TIMER1_RESET TIMER2_RESET TIMER3_RESET TIMER4_RESET TIMER5_RESET TIMER6_RESET	○	
Write message on specified number	MESSAGE1 MESSAGE2 MESSAGE3 MESSAGE4 MESSAGE5	○	
Save specified file**	FILE_SAVE	○	
Load specified file**	FILE_LOAD	○	

* Cannot be selected when the event is Recording start.
** Cannot be selected when the event is User function key.

Event detection methods

Method	Notation	Description
Edge	EDGE	Edge event
Level	LEVEL	State event

Log Information

Saving the Data Acquisition Log File

While recording is stopped, information related to operation of the CF card and power ON/OFF status is saved in text format to a log file with the name RECORDLG.TXT. For information about log statuses and messages, see the MW100 Communication Command manual (IM MW100-17E).

Information Saved to the Log File

- When power is turned OFF or ON
- When CF card is inserted or ejected
- When CF card is formatted
- Upon recording stop or start, etc.
- File creation or deletion
- Triggers
- Time synchronization
- Errors
- Log saving

Example of a Log File

```
Yokogawa DAQMASTER MW100 <Record Info>
  Date     Time    Status  Message
05/01/01 00:00:01 Power   on
05/03/25 09:58:13 Format  ok
05/03/25 10:00:03 Create  DATA0033
05/03/25 10:00:00 Record  start 1
05/03/25 10:00:05 Mode    rotate   -T-
05/03/25 10:00:05 (100ms) 1H / 12cells
05/03/25 10:00:05  10CHs     1409KB
05/03/25 10:00:06 Create  32510100
05/03/25 11:00:15 Create  32510101
05/03/25 12:00:15 Create  32510102
05/03/25 12:40:35 Record  stop 1
05/03/25 12:41:25 Create  ALARMLG
05/03/25 12:14:26 Create  RECORDLG
>>
```

Time indicating when settings were initialized*
Time after internal clock is reset*
Recording starts
Data file creation
Recording stops
Newest information
Termination mark

*** When settings are initialized, the MW100 initial time value of 2005/01/01 00:00:00 is set. After than, if the time is reset, the time after the change is recorded.**

Saving Alarm Summaries

During the recording stop operation, alarm summary information is saved in text format to a log file named ALARMLG.TXT.

Example of an Alarm Summary

Date **Time** **Channel** **Alarm status***

```
EA
05/03/25 10:12:13.000 001  1H off
05/03/25 11:14:12.000 001  1H on
05/03/25 11:14:12.000 002  3L off
05/03/25 11:14:13.000 001  1H off
05/03/25 11:14:21.000 001  2H off
05/03/25 11:14:36.000 002  3L on
05/03/25 11:14:36.000 001  1H on
05/03/25 11:14:54.000 001  2H on
05/03/25 11:15:18.000 002  3L off
05/03/25 11:15:22.000 005  4L off
05/03/25 11:15:25.000 005  4L on
EN
```

Newest information
Termination mark

*** The following are the alarm statuses.**

Alarm number
Alarm type
ON/OFF
1H off

Note

While recording is paused during measurement, if the Stop key is held down, the data acquisition log and alarm summary log are created in the root directory of the CF card.

Log Output

The following logs can be output using communication commands. For information about log statuses and messages, see the MW100 Communication Command manual (IM MW100-17E).

Item	Notation	Request Type
Operation error log	ERROR	No. saved
Alarm summary	ALARM	No. saved
Strain input initial balance result	BALANCE	No. displayed
Data acquisition log	RECORD	No. saved
Recording status	RECSTATUS	No. saved
Message summary	MESSAGE	No. saved
Communication log	COM	No. saved
Operation log	CMD	No. saved
Computation status	MATH	No. saved
Mail client log	SMTP	No. saved
Time synchronization client log	SNTP	No. saved
HTTP server log	HTTP	No. saved
DHCP client log	DHCP	No. saved
FTP client log	FTP_C	No. saved
FTP server log	FTP_S	No. saved
Modbus client log	Modbus_C	No. saved
Modbus client command status	Modbus_CC	No. displayed
Modbus client connection status	Modbus_CS	No. displayed
Modbus master log	Modbus_M	No. saved
Modbus master command status	Modbus_MC	No. displayed
Modbus master connection status	Modbus_MS	No. displayed

E-Mail Function

Notification can be made of alarm occurrences and creation of data files by e-mail. Two recipient locations can be specified. Multiple addresses can be specified for each recipient location. For details about e-mail contents, see chapter 5, “Specifications.”

E-Mail Types

The following types of e-mail can be generated.

E-Mail Type	Operation and Contents of E-Mail
Alarm notification	E-mail is sent when measurement or MATH alarms are activated or cleared. Contents: Channels, levels, and types of alarms that were activated or cleared, instantaneous values of measurement and MATH channels (when selected)
File creation notification	E-mail is sent when a measured, computed, or thinned data file is created. Contents: Created file name and time of send request
Notification of remaining space on media	E-mail is sent when the remaining time on the CF card is determined to be less than the specified time. Contents: Total and remaining space on CF card, and the time of send request
Notification of power ON	E-mail is sent when the power is turned ON. Contents: Time power was cut and turned ON
Error notification	E-mail is sent when an operation error occurs. Contents: Error number and message, and time of send request
Fixed time report	E-mail is sent every specified time interval. Contents: Instantaneous values of the measurement and MATH channels (when selected) and the time of send request Reference time setting: Set in units of one-minute between 00:00 and 23:59 Time interval: Select 1, 2, 3, 4, 6, 8, 12, or 24 h
Test	E-mail is sent when test is executed. If a mail send request occurs during sending of another message, the request is ignored.

Subject

The e-mail transmission type is added to the subject. A user-specified string can be added to the transmission type in the subject.
The following subject topics are available.

E-Mail Type	Subject
Alarm notification	[Alarm Summary] + user specified string
File creation notification	[File End] + user specified string
Notification of remaining space on media	[Media Remain] + user specified string
Notification of power ON	[Power Failure] + user specified string
Error notification	[ERROR] + user specified string
Fixed time report	[Periodic Data] + user specified string
Test	[Test] + user specified string

E-mail Retransmission

If e-mail transmission fails, it will be retried two more times at about thirty to sixty second intervals.
If retransmission fails twice, the e-mail is deleted without being sent. Retransmission is not performed if the e-mail type is Test.

Example of an E-Mail Transmission

- Alarm notification e-mail

```
From: mw100user@daqmaster.com
Date: Fri,25 Mar 2005 19:57:00  +0900
Subject: [Alarm Summary]
To: mw100user2@daqmaster.com, mw100user3@daqmaster.com

Alarm Summary
<Time>
DATE 05/03/25
TIME 19:56:32

<Alarm Summary>
01   2h on
04   4H off
33   2r on
       :
A005 2H off

<CH Data>
N 01 mV    +12345E-1
N 04 mV    +12345E-1
N 05 mV    +12345E-1
               :
N A001 +12345678E-1
N A002 +12345678E-1
               :
```

Mail header

Date and time when alarm occurs

Alarm contents

Instantaneous measured and computed values

- Power supply ON notification e-mail

```
From: mw100user@daqmaster.com
Date: Fri,25 Mar 2005 19:57:00  +0900
Subject: [Power Faliure]
To: mw100user2@daqmaster.com, mw100user3@daqmaster.com

Power Faliure
<Power Off>
DATE 05/03/24
TIME 19:58:28

<Power On>
DATE 05/03/25
TIME 19:56:40
```

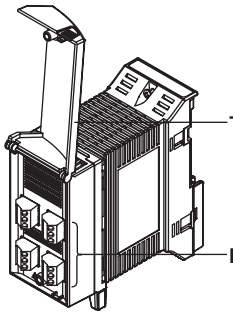
Mail header

Date/time power failed

Date/time power restored

1.4 Functions of the 4-CH, High-Speed Universal Input Module

This module allows up to four inputs of DC voltage, thermocouple, 3-wire RTD, or digital input (DI) at a minimum measurement interval of 10 ms.



Measurement Input Types

Measurement Input Type	Notation
Do not measure	SKIP
DC voltage	VOLT
Thermocouple	TC
Resistance temperature detector	RTD
DI	DI
Remote RJC	RRJC

Measuring Range

DC Voltage

Measuring Range	Notation	Rated Measurement Range
20 mV	20 mV	–20.000 to 20.000 mV
60 mV	60 mV	–60.00 to 60.00 mV
200 mV	200 mV	–200.00 to 200.00 mV
2 V	2 V	–2.0000 to 2.0000 V
6 V	6 V	–6.000 to 6.000 V
20 V	20 V	–20.000 to 20.000 V
100 V	100 V	–100.00 to 100.00 V
60 mV (high resolution)	60 mVH	0.000 to 60.000 mV
1 V	1 V	–1.0000 to 1.0000 V
6 V (high resolution)	6 VH	0.0000 to 6.0000 V

Thermocouple

Measuring Range	Notation	Rated Measuring Range
Type-R	R	0.0 to 1760.0°C
Type-S	S	0.0 to 1760.0°C
Type-B	B	0.0 to 1820.0°C
Type-K	K	–200.0 to 1370.0°C
Type-E	E	–200.0 to 800.0°C
Type-J	J	–200.0 to 1100.0°C
Type-T	T	–200.0 to 400.0°C
Type-N	N	0.0 to 1300.0°C
Type-W	W	0.0 to 2315.0°C
Type-L	L	–200.0 to 900.0°C

Thermocouple (cont.)

Measuring Range	Notation	Rated Measuring Range
Type-U	U	–200.0 to 400.0°C
KPvsAu7Fe	KPvsAu7Fe	0.0 to 300.0K
PLATINEL	PLATINEL	0.0 to 1400.0°C
PR40-20	PR40-20	0.0 to 1900.0°C
NiNiMo	NiNiMo	0.0 to 1310.0°C
WRe3-25	WRe3-25	0.0 to 2400.0°C
W/WRe26	WWRe26	0.0 to 2400.0°C
Type-N (AWG14)	N14	0.0 to 1300.0°C
TXK GOST	XK	–200.0 to 600.0°C

Resistance Temperature Detector (1 mA)

Measuring Range	Notation	Rated Measuring Range
Pt100	Pt100-1	–200.0 to 600.0°C
JPt100	JPt100-1	–200.0 to 550.0°C
Pt100 (high resolution)	Pt100-1H	–140.00 to 150.00°C
JPt100 (high resolution)	JPt100-1H	–140.00 to 150.00°C
Ni100 SAMA	Ni100SAMA	–200.0 to 250.0°C
Ni100 DIN	Ni100DIN	–60.0 to 180.0°C
Ni120	Ni120	–70.0 to 200.0°C
Pt100 (high noise resistance)	Pt100-1R	–200.0 to 600.0°C
JPt100 (high noise resistance)	JPt100-1R	–200.0 to 550.0°C
Pt100 GOST	Pt100G	–200.0 to 600.0°C

Resistance Temperature Detector (2 mA)

Measuring Range	Notation	Rated Measuring Range
Pt100	Pt100-2	–200.0 to 250.0°C
JPt100	JPt100-2	–200.0 to 250.0°C
Pt100 (high resolution)	Pt100-2H	–140.00 to 150.00°C
JPt100 (high resolution)	JPt100-2H	–140.00 to 150.00°C
Pt50	Pt50	–200.0 to 550.0°C
Cu10 GE	Cu10GE	–200.0 to 300.0°C
Cu10 L&N	Cu10LN	–200.0 to 300.0°C
Cu10 WEED	Cu10WEED	–200.0 to 300.0°C
Cu10 BAILEY	Cu10BAILEY	–200.0 to 300.0°C
J263B	J263B	0.0 to 300.0K
Cu10 at 20°C alpha=0.00392	Cu10a392	–200.0 to 300.0°C
Cu10 at 20°C alpha=0.00393	Cu10a393	–200.0 to 300.0°C
Cu25 at 0°C alpha=0.00425	Cu25	–200.0 to 300.0°C
Cu53 at 0°C alpha=0.00426035	Cu53	–50.0 to 150.0°C
Cu100 at 0°C alpha=0.00425	Cu100	–50.0 to 150.0°C
Pt25 (JPt100 × 1/4)	Pt25	–200.0 to 550.0°C
Cu10 GE (high resolution)	Cu10GEH	–200.0 to 300.0°C
Cu10 L&N (high resolution)	Cu10LNH	–200.0 to 300.0°C
Cu10 WEED (high resolution)	Cu10WEEDH	–200.0 to 300.0°C
Cu10 BAILEY (high resolution)	Cu10BAILEYH	–200.0 to 300.0°C

Resistance Temperature Detector (2 mA, cont.)

Measuring Range	Notation	Rated Measuring Range
Pt100 (high noise resistance)	Pt100-2R	–200.0 to 250.0°C
JPt100 (high noise resistance)	JPt100-2R	–200.0 to 250.0°C
Cu100 GOST	Cu100G	–200.0 to 200.0°C
Cu50 GOST	Cu50G	–200.0 to 200.0°C
Cu10 GOST	Cu10G	–200.0 to 200.0°C

DI

Measuring Range	Notation	Rated Measuring Range
LEVEL	LEVEL	Vth=2.4V
Contact input	CONTACT	100 Ω or less, ON, 10 kΩ or less, OFF

Measurement Interval, Integration Time, and Filter

You can select from the following measurement intervals for this module.

10 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 60 s

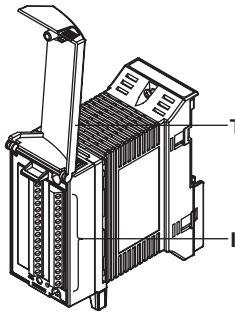
The integral time and types of filters applied vary depending on the measurement interval. For details, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

Measurement Synchronization

Measurement is synchronized on each channel.

1.5 Functions of the 10-CH, Medium-Speed Universal Input Module

This module allows up to ten inputs of DC voltage, thermocouple, 3-wire RTD, and digital input (DI) at a minimum measurement interval of 100 ms.



Measurement Input Types

Measurement Input Type	Notation
No measurement	SKIP
DC voltage	VOLT
Thermocouple	TC
Resistance temperature detector	RTD
DI	DI
Remote RJC	RRJC

Measuring Range

DC Voltage

Measuring Range	Notation	Rated Measuring Range
20 mV	20 mV	–20.000 to 20.000 mV
60 mV	60 mV	–60.00 to 60.00 mV
200 mV	200 mV	–200.00 to 200.00 mV
2 V	2 V	–2.0000 to 2.0000 V
6 V	6 V	–6.000 to 6.000 V
20 V	20 V	–20.000 to 20.000 V
100 V	100 V	–100.00 to 100.00 V
60 mV (high resolution)	60 mVH	0.000 to 60.000 mV
1 V	1 V	–1.0000 to 1.0000 V
6 V (high resolution)	6 VH	0.0000 to 6.0000 V

Thermocouple

Measuring Range	Notation	Rated Measuring Range
Type-R	R	0.0 to 1760.0°C
Type-S	S	0.0 to 1760.0°C
Type-B	B	0.0 to 1820.0°C
Type-K	K	–200.0 to 1370.0°C
Type-E	E	–200.0 to 800.0°C
Type-J	J	–200.0 to 1100.0°C
Type-T	T	–200.0 to 400.0°C
Type-N	N	0.0 to 1300.0°C
Type-W	W	0.0 to 2315.0°C

Thermocouple (cont.)

Measuring Range	Notation	Rated Measuring Range
Type-L	L	–200.0 to 900.0°C
Type-U	U	–200.0 to 400.0°C
KPvsAu7Fe	KPvsAu7Fe	0.0 to 300.0 K
PLATINEL	PLATINEL	0.0 to 1400.0°C
PR40-20	PR40-20	0.0 to 1900.0°C
NiNiMo	NiNiMo	0.0 to 1310.0°C
WRe3-25	WRe3-25	0.0 to 2400.0°C
W/WRe26	WWRe26	0.0 to 2400.0°C
Type-N (AWG14)	N14	0.0 to 1300.0°C
TXK GOST	XK	–200.0 to 600.0°C

Resistance Temperature Detector (1 mA)

Measuring Range	Notation	Rated Measuring Range
Pt100	Pt100-1	–200.0 to 600.0°C
JPt100	JPt100-1	–200.0 to 550.0°C
Pt100 (high resolution)	Pt100-1H	–140.00 to 150.00°C
JPt100 (high resolution)	JPt100-1H	–140.00 to 150.00°C
Ni100 SAMA	Ni100SAMA	–200.0 to 250.0°C
Ni100 DIN	Ni100DIN	–60.0 to 180.0°C
Ni120	Ni120	–70.0 to 200.0°C
Pt50	Pt50	–200.0 to 550.0°C
Cu10 GE	Cu10GE	–200.0 to 300.0°C
Cu10 L&N	Cu10LN	–200.0 to 300.0°C
Cu10 WEED	Cu10WEED	–200.0 to 300.0°C
Cu10 BAILEY	Cu10BAILEY	–200.0 to 300.0°C
J263B	J263B	0.0 to 300.0 K
Cu10 at 20°C alpha=0.00392	Cu10a392	–200.0 to 300.0°C
Cu10 at 20°C alpha=0.00393	Cu10a393	–200.0 to 300.0°C
Cu25 at 0°C alpha=0.00425	Cu25	–200.0 to 300.0°C
Cu53 at 0°C alpha=0.00426035	Cu53	–50.0 to 150.0°C
Cu100 at 0°C alpha=0.00425	Cu100	–50.0 to 150.0°C
Pt25 (JPt100 × 1/4)	Pt25	–200.0 to 550.0°C
Cu10 GE (high resolution)	Cu10GEH	–200.0 to 300.0°C
Cu10 L&N (high resolution)	Cu10LNH	–200.0 to 300.0°C
Cu10 WEED (high resolution)	Cu10WEEDH	–200.0 to 300.0°C
Cu10 BAILEY (high resolution)	Cu10BAILEYH	–200.0 to 300.0°C
Pt100 GOST	Pt100G	–200.0 to 600.0°C
Cu100 GOST	Cu100G	–200.0 to 200.0°C
Cu50 GOST	Cu50G	–200.0 to 200.0°C
Cu10 GOST	Cu10G	–200.0 to 200.0°C

DI

Measuring Range	Notation	Rated Measuring Range
LEVEL	LEVEL	Vth=2.4 V
Contact input	CONTACT	1 kΩ or less, ON, 100 kΩ or less, OFF (shunt capacitance: 0.01 μF or less)

Measurement Interval, Integration Time, and Filter

You can select from the following measurement intervals for this module.

100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 60 s

The integral time and types of filters applied vary depending on the measurement interval. For details, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

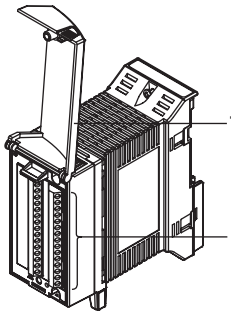
If the measurement interval is 100 ms, burnout detection is performed on one channel during one measurement interval. After measurement starts when in the burnout condition, or after the burnout, burnout detection is disabled for up to ten measurements (approximately one second).

Measurement Synchronization

Since measurement is sequential, measurement on each channel is not synchronized.

1.6 Functions of the 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module

This module allows up to six inputs of DC voltage, thermocouple, 4-wire RTD, 4-wire resistance, and digital input (DI) at a minimum measurement interval of 100 ms.



Measurement Input Types

Measurement Input Type	Notation
No measurement	SKIP
DC voltage	VOLT
Resistance temperature detector	RTD
Resistance	OHM
DI	DI

Measuring Range

DC Voltage

Measuring Range	Notation	Rated Measuring Range
20 mV	20 mV	–20.000 to 20.000 mV
60 mV	60 mV	–60.00 to 60.00 mV
200 mV	200 mV	–200.00 to 200.00 mV
2 V	2 V	–2.0000 to 2.0000 V
6 V	6 V	–6.000 to 6.000 V
20 V	20 V	–20.000 to 20.000 V
100 V	100 V	–100.00 to 100.00 V
60 mV (high resolution)	60 mVH	0.000 to 60.000 mV
1 V	1 V	–1.0000 to 1.0000 V
6 V (high resolution)	6 VH	0.0000 to 6.0000 V

Resistance Temperature Detector (1 mA)

Measuring Range	Notation	Rated Measuring Range
Pt100	Pt100-1	–200.0 to 600.0°C
JPt100	JPt100-1	–200.0 to 550.0°C
Pt100 (high resolution)	Pt100-1H	–140.00 to 150.00°C
JPt100 (high resolution)	JPt100-1H	–140.00 to 150.00°C
Ni100 SAMA	Ni100SAMA	–200.0 to 250.0°C
Ni100 DIN	Ni100DIN	–60.0 to 180.0°C
Ni120	Ni120	–70.0 to 200.0°C
Pt50	Pt50	–200.0 to 550.0°C
Cu10 GE	Cu10GE	–200.0 to 300.0°C
Cu10 L&N	Cu10LN	–200.0 to 300.0°C
Cu10 WEED	Cu10WEED	–200.0 to 300.0°C
Cu10 BAILEY	Cu10BAILEY	–200.0 to 300.0°C

Resistance Temperature Detector (1 mA, cont.)

Measuring Range	Notation	Rated Measuring Range
J263B	J263B	0.0 to 300.0K
Cu10 at 20°C alpha=0.00392	Cu10a392	–200.0 to 300.0°C
Cu10 at 20°C alpha=0.00393	Cu10a393	–200.0 to 300.0°C
Cu25 at 0°C alpha=0.00425	Cu25	–200.0 to 300.0°C
Cu53 at 0°C alpha=0.00426035	Cu53	–50.0 to 150.0°C
Cu100 at 0°C alpha=0.00425	Cu100	–50.0 to 150.0°C
Pt25 (JPt100 × 1/4)	Pt25	–200.0 to 550.0°C
Cu10 GE (high resolution)	Cu10GEH	–200.0 to 300.0°C
Cu10 L&N (high resolution)	Cu10LNH	–200.0 to 300.0°C
Cu10 WEED (high resolution)	Cu10WEEDH	–200.0 to 300.0°C
Cu10 BAILEY (high resolution)	Cu10BAILEYH	–200.0 to 300.0°C
Pt100 GOST	Pt100G	–200.0 to 600.0°C
Cu100 GOST	Cu100G	–200.0 to 200.0°C
Cu50 GOST	Cu50G	–200.0 to 200.0°C
Cu10 GOST	Cu10G	–200.0 to 200.0°C

Resistance Temperature Detector (0.25 mA)

Measuring Range	Notation	Rated Measuring Range
Pt500	Pt500	–200.0 to 600.0°C
Pt1000	Pt1000	–200.0 to 600.0°C

Resistance

Measuring Range	Notation	Rated Measuring Range
20 Ω (measured current 1 mA)	20 ohm	0.000 to 20.000 Ω
200 Ω (measured current 1 mA)	200 ohm	0.00 to 200.00 Ω
2 kΩ (measured current 0.25 mA)	2000 ohm	0.0 to 2000.0 Ω

DI

Measuring Range	Notation	Rated Measuring Range
LEVEL	LEVEL	Vth=2.4V
Contact input	CONTACT	1 kΩ or less, ON, 100 kΩ or less, OFF (shunt capacitance: 0.01 μF or less)

Measurement Interval, Integration Time, and Filter

You can select from the following measurement intervals for this module.

100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 60 s

The integral time and types of filters applied vary depending on the measurement interval. For details, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

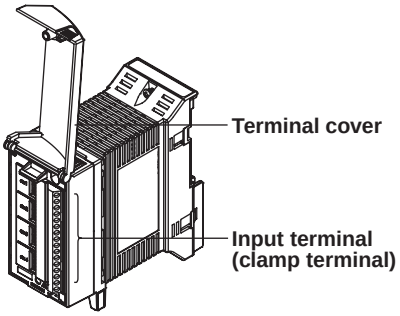
Measurement Synchronization

Since measurement is sequential, measurement on each channel is not synchronized.

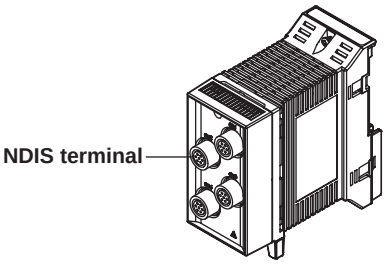
1.7 Functions of the 4-CH, Medium-Speed Strain Input Module

This module allows up to four inputs of measurement from strain gauges and strain gauge type sensors at a minimum measurement interval of 100 ms.

-B12, -B35



-NDI



Measurement Input Types

Measurement Input Type	Notation
No measurement	SKIP
Strain	STR

Measuring Range

Strain Input

Measurement Range Type	Notation	Rated Measuring Range
2000 μSTR	2000 uSTR	–2000.0 to 2000.0 μSTR
20000 μSTR	20000 uSTR	–20000 to 20000 μSTR
200000 μSTR	200000 uSTR	–200000 to 200000 μSTR

Measurement Interval, Integration Time, and Filter

You can select from the following measurement intervals for this module.

100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 60 s

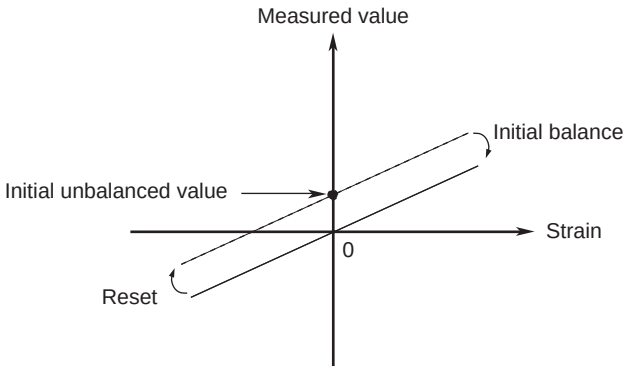
The integral time and types of filters applied vary depending on the measurement interval. For details, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

Measurement Synchronization

Since measurement is sequential, measurement on each channel is not synchronized.

Initial Balancing (Unbalance Adjustment)

When configuring a bridge circuit with a strain gauge, due to the slight deviation in resistance of the strain gauge, the bridge circuit will not necessarily be balanced even if the strain of the circuit under test is zero, and the measured value may not be zero (the value in such cases is called the *initial unbalanced value*).
Therefore, when taking measurements you must first balance the bridge and if the strain is zero, obtain a measured value of zero. This is called *initial balancing* (setting the initial unbalanced value to zero).



With the MW100, initial balancing is performed in the ±10000 μstrain range.

Initial balance: The value when the command is executed is taken as the initial unbalanced value, and the measured value is set to zero.

Reset: The value set during initial balancing is reset to zero. The initial unbalanced value is used for the measured value as-is.

Note

If the measuring range is changed, the initial balancing is reset.
After a range change, you must redo initial balancing.

Initial Balance Selection Items

Type	Notation	Description
Reset	RESET	Resets the initial balance values.
Execute	EXECUTE	Executes initial balancing.

Scaling Settings of the Strain Gauge Type Sensor

This is an explanation of scaling settings used to measure physical quantities such as load and length using a strain gauge type sensor.

The basic relational equation is as follows.

1 mV/V = 2000 μSTR (equation 1)

The following gives two examples, one when the rated input and output are known, and one when the calibration coefficient is known. (Hereinafter, μ-strain will be expressed as μSTR).

When the Rated Input and Output Are Known

The following specific example provides an explanation.

- Rated input 200N (set to Y)
- Rated output 0.985 mV/V (set to K)

In this case, if a 200 N load is introduced, an output of 0.985 mV/V results.
From the relationship in equation 1, if 200 N is applied, it means that
an output of: 0.985 mV/V = 0.985*2000 = 1970 μSTR is obtained.
In other words, for each 1N, 1970 μSTR/200N = 9.85 μSTR/N of output results.
Therefore, the scaling settings are entered as follows.
When Measuring at 50 to 150 N

Scale minimum: 50 (set to Smin)
Scale maximum: 150 (units: N) (set to Smax)

therefore,

Span minimum: 50 × 9.85 μSTR/N = 492.5 μSTR
Span maximum: 150 × 9.85 = 1477.5 μSTR

would be appropriate settings.
Hence, the measuring range is 2000 μSTR.

Generally, the range is as follows.
Using the symbols explained up to now, after setting the minimum and maximum scale, we can describe the minimum and maximum values of span as:

Min. value of span = [(K(mV/V) × 2000) / Y(unit)] × Smin (μSTR)
Max. value of span = [(K(mV/V) × 2000) / Y(unit)] × Smax (μSTR)

When the Calibration Coefficient is Known

An example using a displacement gauge provides an explanation.

- Rated input 20 mm
- Calibration coefficient 0.003998 mm / (1 μV/V)

Basically, if you can convert the calibration coefficient to the rated output mentioned in "When Rated Input and Rated Output Are Known," the previous equation can be used.

Using equation 1,

1 μV/V = 0.001 mV/V = 0.001 × 2000 μSTR = 2 μSTR

therefore the rated output with this sensor when 20 mm is input would be

20 mm ÷ [0.003998 mm/2 μSTR] = 10005 μSTR

in other words, for 1 mm, an output of:

10005 μSTR / 20 mm = 500.25 μSTR/mm

can be obtained.

Thereafter in the same manner, if you wish to measure with a scale of 2 mm to 15 mm, the settings are

Scale minimum: 2
Scale maximum: 15 (Units: mm)

therefore,

Span minimum: 2 × 500.25 μSTR/mm = 1000.5 μSTR
Span maximum: 15 × 500.25 μSTR = 7503.75 μSTR

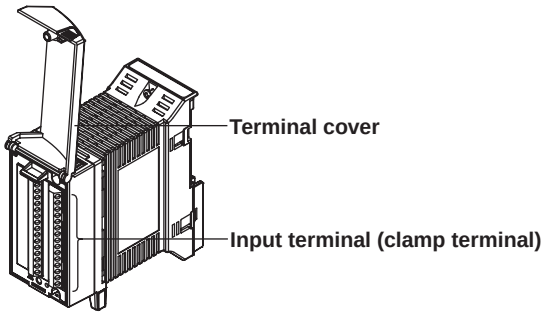
would be appropriate settings.

Since the measurement range is the 20000 μSTR range, the resolution on the MW100 comes to 1 μSTR, so we round to the following:

Span minimum: 1001 μSTR
Span maximum: 7504 μSTR

1.8 Functions of the 10-CH, High-Speed Digital Input Module

The “-D05” module is equipped with ten inputs for measurement of no-voltage contact, open collector, and 5 V logic inputs at a minimum measurement interval of 10 ms.
The “-D24” module is equipped with ten inputs and measures 24-V logic inputs at a minimum measurement interval of 10 ms.



Measurement Input Types

Measurement Input Type	Notation
No measurement	SKIP
Digital	DI

Measuring Range

DI (MX115-D05)

Measurement Range Type	Notation	Rated Measuring Range
LEVEL	LEVEL	OFF at 1 V or less and ON at 3 V or more
Contact input	CONTACT	100 Ω or less, ON, 100 kΩ or less, OFF

DI (MX115-D24)

Measurement Range Type	Notation	Rated Measuring Range
LEVEL	LEVEL	OFF at 6 V or less and ON at 16 V or more

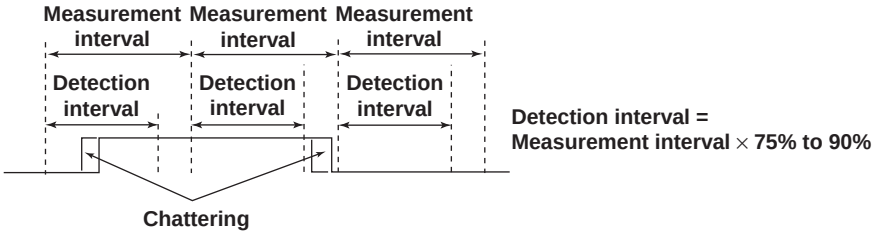
Measurement Interval

Select 10 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, or 60 s.

Filters

The module detects ON/OFF as shown below to prevent the effects of chattering. If the measurement interval is set a value greater than four times the chattering period, measurement is possible by avoiding chattering effects.

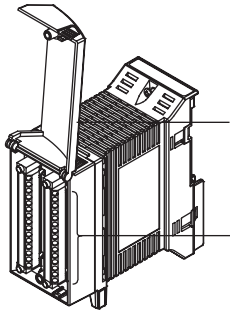
- Measurement interval of 5 s or less: Use the wider of the ON/OFF width of the detection period (approximately 75% to 90% of the measurement interval)



- Measurement interval of 5 s or more: Use the wider of the ON/OFF width of approximately 4.5 s

1.9 Functions of the 8-CH, Medium-Speed Analog Output Module

The module has eight outputs for voltage or current.
An external power source (24 V) is required for current output.
For voltage output only, an external power source is not required.



Output Types

Output Type	Notation
No output	SKIP
Analog output	AO

Output Method

Output Method	Notation	Actions
Transmission Output	TRANS	Outputs a voltage or current according to the measured results of the input channel specified on the same unit. You can also produce pattern output using the broken line input function.
Command Output	COM	Outputs specified values based on values sent from the PC.

Output Range

Output Range	Notation	Output range
Voltage	10 V	–10.000 V to 10.000 V
Current	20 mA	0.000 mA to 20.000 mA

Output Update Interval

The output is updated at 100-ms (minimum) intervals. It is not synchronized to the measurement interval.

Operation upon Startup and Errors

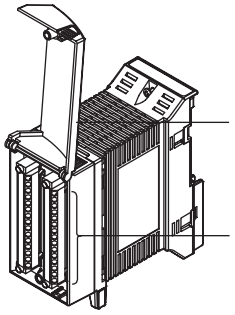
See section 1.11, “Operation of the Eight-Channel Medium-Speed Analog Output Module and the Eight-Channel Medium Speed PWM Output Module.”

Output Operation during Calibration

Calibration Condition	Output Operation
Channels being calibrated	Command output (output of calibration value)
Non-calibrated channels	Holds the output value (holds the value last output during steady operation (see section 1.11))

1.10 Functions of the 8-CH, Medium-Speed PWM Output Module

This module has eight outputs for pulse wave duty. A certain duty pulse waveform is output according to the specified pulse interval. A pulse interval can be set for each channel.



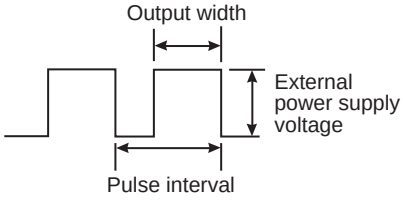
Output Types

Output Type	Notation
No output	SKIP
PWM Output	PWM

Output Method

Output Method	Notation	Actions
Transmit	TRANS	Outputs a duty pulse wave according to the measured or computed results of the input channel specified on the same unit. You can also produce pattern output using the broken line input function.
Command output	COM	Outputs specified data based on the values sent from the PC.

Output Waveform



$$\text{Duty} = \frac{\text{Output width}}{\text{Pulse interval}} \times 100\ [\%]$$

Pulse Interval

1 ms to 300 s (can be set channel by channel)

Range	Notation	Setting Range
1 ms interval setting range	1 ms	1 ms to 30.000 s (can be set in units of 1 ms)
10 ms interval setting range	10 ms	10 ms to 300.00 s (can be set in units of 10 ms)

* The pulse interval can be set by determining the pulse interval coefficient.
The pulse interval coefficient is set from 1 to 30000.
Pulse interval = range × pulse interval coefficient

Output Update Interval

The output is updated at 100-ms (minimum) intervals. It is not synchronized to the measurement interval.

Output Range

0.000% to 100.000%

Operation upon Startup and Error Occurrence

See section 1.11, “Operation of the 8-CH Medium-Speed Analog Output Module and the 8-CH Medium Speed PWM Output Module.”

1.11 Operation of the 8-CH Medium-Speed Analog Output Module and the 8-CH Medium Speed PWM Output Module

The following describes the output operation of the analog and PWM output modules.

Output upon Startup and Error Occurrence

Output Selection	Notation	Actions
Hold previous value	LAST	Holds the last value output.
Output preset value	PRESET	Outputs an arbitrarily specified output value.

Output Format

In the output format below, current (analog output module) or pulse wave duty (PWM output module) is output.

- Transmission output: Analog or PWM output occurs according to the measured or computed values from the specified channel of the same unit. All input modules can be specified (but not output modules).
- Command output: When commands are received from the PC, the instrument outputs analog or PWM signals accordingly. Once the power is turned ON and the unit is able to perform communication, command output becomes possible. For transmission output within a unit, after measurement or computation starts, the output values are updated upon transmission output.

Output on Disabled Channels

Type of Disabled Channel	Output
Channels changed from enabled to disabled through setting changes	Holds the last output value when channel was active
Channels invalid upon startup	Output according to settings upon startup

The timing at which changes applied to the output module take effect is according to the events below.
(Ex. When changing settings from transmission output within a unit to command output, the last value of transmission output within a unit is held until the command output request is generated.)

Output Operation per Settings and Setting Changes

Condition upon Power ON and Output Operation

Condition When Power Is Turned ON		Output Operation
When Output Settings are Disabled		Operation when power is turned ON
With transmission output within a unit, and reference channels disabled	Before meas. start	Operation when power is turned ON
	Start measurement	Output upon error occurrences
Transmission output within a unit	Before meas start	Operation when power is turned ON
	Start measurement	Transmission output
Command output	No output request	Operation when power is turned ON
	Output requested	Command output

Output Operation through Setting Changes (Common)

Setting Changes (Contents)		Output Operation
Setting changes for operation	Prev. value held → preset value	Outputs the preset value the on startup next time the power is turned ON
	Preset value → hold prev. value	The last output value from the previous operation is held for the next time the power is turned ON (outputs the output value active when the power was last turned OFF during the previous session)
Setting changes for operation	Prev. value held → preset value	Outputs the preset value the upon error occurrence next time an error occurs
	Preset value → hold prev. value	Holds the last output value active before the error occurs for the next time an error occurs.
Preset value setting changes*		No changes (as above)
Change setting of output ch from Enabled → Disabled		Holds the output value (last output value)

* Changes are also applied to inactive channels.

Output Operation through Setting Changes (Individually by Output Setting)

Output Setting	Setting Changes (Contents)		Output Operation
Transmission output Within units	Range setting changes	AO: V ⇔ mA	Output value held (until the next output event)
		PWM: 1 ms ⇔10 ms or interval	
	Operation setting changes	Transmission within units → command output	
	Span setting changes		
Command output	Range setting changes	AO: V ⇔ mA	Output value held (until the next output event)
		PWM: 1 ms ⇔10 ms or interval	
	Operation setting changes	Command output → transmission within a unit	

When the range settings of a PWM output module are changed, the output value is not held.

Steady Output Operation

Output Operation When Connected for Communication

Communication Connection Status	Output Operation
Normal connection (initial connection after power ON)	Operation when power is turned ON
Communications opened successfully (when communications were cut and restored for the 2nd or more time)	Holds the output value (last output value)
Communication disconnected successfully	Holds the output value (last output value)

Output Operation during Measurement and When Performing Transmission Output

"Transmission output execution ON" in the table is when the transmission output control is ON.

"Transmission output execution OFF" in the table is when the transmission output control is OFF.

Output Setup	Status		Output Operation
Transmission output within unit	Meas. stop → Measurement start		Transmission output start or output value hold (depending on the transmission output execution on/off status) on: transmission output starts off: output value held
	Measuring → Measurement stop		Holds the output value (last output value)
	Measuring	Transmission output execution off → on	Transmission start
		Transmission output execution on → off	Holds output value (last output value)
Command output	Meas. stop → Measurement start		No effect
	Measuring → Measurement stop		No effect
	Measuring	Transmission output execution off → on	No effect
		Transmission output execution on → off	No effect

Output Operation during an Abnormality and after Recovery from the Abnormality

Output Operation during an Abnormality (by Module)

Abnormal Module	Display	Status	Output Operation
Main module	b□*	System errors	Operation when power is turned ON
	bF	Dip switches	
	F0	ROM error	
	F1	SRAM error	
	F2	EEPROM error	
	F3	Battery error	
	F4	Ethernet error	
Output modules	U0	Range information error	Operation when power is turned ON or when output value uncertain
	U1	Calibration value error	
	U2	Error during calibration	Internal communication error occurred, resulting in an error recovery event. If the error recovery time is 10 s or more, output is performed per the operation for error occurrence, and then output is executed per the operation for power ON.
	U3	Error in writing the calibration value.	
	U4	Unusable modules	Operation when power is turned ON or when output value uncertain
Input modules	U0	Range information error	Operation when errors occur (transmission between units output only, since the transmission source input channel is illegal)
	U1	Calibration value error	
	U4	Unusable modules	

* The number corresponding to the error is shown in the □.

Output Operation during an Abnormality (by Output Setting)

Output Setting	Abnormal Status	Output Operation
Transmission output within units	Referenced input channels are +Over	Outputs a value +5% of the specified span of the output channel*
	Referenced input channels are –Over	Outputs a value –5% of the specified span of the output channel
	Referenced input channel is illegal (input module removed)	Operation upon errors
	Referenced input channel is set to Skip	
	Referenced input channel is Invalid (math error in Differential computation)	
	Internal communication error	Output value held (occurs immediately after an internal communication error, but there is a recovery action**)
	CPU abnormality	Operation upon errors
Command output	Internal communication error	Output value held (occurs upon an internal communication error, but there is a recovery action**)
	CPU abnormality	Operation upon errors

* PWM output may not always reach +5%.
** See “Output Operation after Recovery from an Abnormality.”

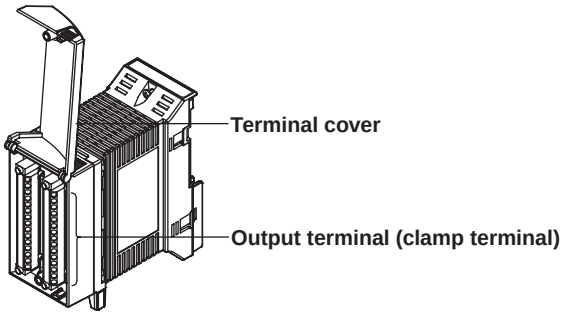
Output Operation after Recovery from an Abnormality (by Output Setting)

Output Setting	Abnormality Recovery	Output Operation
Transmission output within units	Referenced input module recovers (removed input modules are inserted)	Operation upon errors → transmission output
	Referenced input channel changed from Skip to Measurement range	
	Referenced input channel is restored from Invalid (math error in Differential computation) to normal	
	Recover after internal communication error	If the error recovery time is 10 s or more; operation upon error → operation upon power ON→ Transmission output
		If the error recovery time is within 10 s; operation upon startup → transmission output
	CPU abnormality (does not recover)	Operation upon errors
Command output	Recover after internal communication error	If the error recovery time is 10 s or more; operation upon error → operation upon power ON→ command output*
		If the error recovery time is within 10 s; operation upon startup → command output*
	CPU abnormality (does not recover)	Operation upon errors

* Executed by command output from the PC after recovering from the error.

1.12 Functions of the 10-CH, Medium-Speed Digital Output Module

This module has ten contact signal outputs that are based on alarm output settings and output settings from the PC.



Output Types

The following types (output factors) are available.

Type	Notation	Description
Alarm	ALARM	Measurement and computation channels
Command	COM	Command DO operation
Media	MEDIA	When the remaining space on the CF card reaches the specified time
Fail	FAIL	When an abnormality occurs on the CPU of the MW100 main module
Error	ERROR	When an error is detected on the MW100

Output Update Interval

The output is updated at 100-ms intervals. It is not synchronized to the measurement interval.

Relay Excitation State / Hold Operation

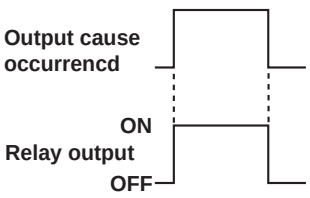
You can select whether or not to energize the output relays upon output. The excitation status selection differs depending on the output type.

Excitation Status	Notation	Description	Available Output Types
Energize	ENERG	Energize when relay output is ON	ALARM/COM/ERROR/MEDIA
De-energize	DE_EN	Do not energize when relay output is ON	ALARM/COM/FAIL

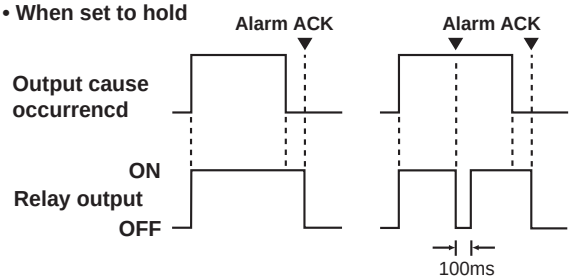
Also, when a condition in which alarm output must be cleared arises, you can select whether to turn output relays OFF (Non-hold), or leave them ON until an output clear command (alarm ACK) appears (Hold).

Hold operation	Notation	Description
Hold	ON	Maintains relay output even after relay output is cancelled.
Non-Hold	OFF	Does not maintain relay output when relay output is cancelled (normal operation).

• When set to non-hold



• When set to hold



Relay Operation

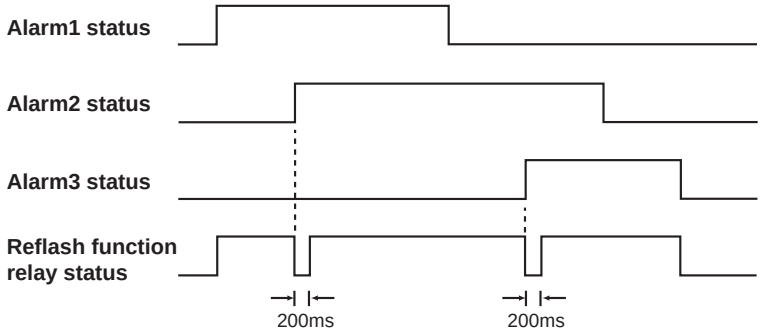
The following types of relay operation are available.

Operation	Description
AND	Output ON when all alarms assigned to each alarm output relay activate.
OR	Output ON when at least one alarm assigned to each alarm output relay activates.

Reflash Function

The relay operates after the first alarm. If a second alarm activates, the relay restarts after briefly stopping operation.

- The non-operation period is 200 ms.
- Even if a new alarm occurs during the non-operation, the non-operation time is not extended.
- The number of output relays that can be specified for the reflash function is unlimited.
- When selecting relay output other than alarm output relays, the reflash function specification is disabled.
- You can specify the reflash function when OR is selected for the AND/OR function and Non-Hold is selected for the Hold/Non-Hold function.



1.13 MATH Function (/M1 Option)

Overview of the MATH Function

You can enter expressions using constants, operators, and functions described below. The computed results can be displayed and recorded (saved). MATH allows you to determine the average/maximum/minimum of a specified channel on a specified date/time, or output events (start/stop record, reset time, etc.) under specified conditions.

Number of MATH Channels

Computation can be performed on sixty channels, and 240 channels can be used for communication input. The maximum number of characters that can be used in an expression is 120 for MATH channels and 8 for communication input channels.

MATH Types

The following types of computations can be performed.

- Basic math
- Logical operations
- Relational operations
- Arithmetic functions
- TLOG functions
- CLOG functions
- Conditional expressions

Basic Math

Type	Operator	Example	Explanation
Addition	+	001+002	Finds the sum of measured values on channels 001 and 002
Subtraction	-	002-001	Finds the difference in the measured values of channels 001 and 002.
Multiplication	*	003*K01	Multiplies the measured data on channel 003 by constant K01
Division	/	004/K02	Divides the measured data on channel 004 by constant K02
Exponentiation	**	005**006	Raises the measured data of channel 005 to the power of the measured data of channel 006.

Logical Operations

Type	Operator	Example	Explanation
Logical product	AND	001AND002	When channel 001 = 0 and channel 002 = 0, 0 When channel 001 ≠ 0 and channel 002 = 0, 0 When channel 001 = 0 and channel 002 ≠ 0, 0 When channels 001 and 002 ≠ 0, 1
Logical sum	OR	001OR002	When channel 001 = 0 and channel 002 = 0, 0 When channel 001 ≠ 0 and channel 002 = 0, 1 When channel 001 = 0 and channel 002 ≠ 0, 1 When channels 001 and 002 ≠ 0, 1
Exclusive OR	XOR	001XOR002	When channel 001 = 0 and channel 002 = 0, 0 When channel 001 ≠ 0 and channel 002 = 0, 1 When channel 001 = 0 and channel 002 ≠ 0, 1 When channels 001 and 002 ≠ 0, 0
Logical negation	NOT	NOT001	When channel 001 = 0, 1 When channel 001 ≠ 0, 0

Relational Operations

Type	Operators	Example	Explanation
Equal	.EQ.	001.EQ.002	When channel 001 = channel 002, 1 When channel 001 ≠ channel 002, 0
Not equal	.NE.	002.NE.001	When channel 001 ≠ channel 002, 1 When channel 001 = channel 002, 0
Greater than	.GT.	003.GT.K01	When channel 003 > constant K01, 1 When channel 003 ≤ constant K01, 0
Less than	.LT.	004.LT.K10	When channel 004 < constant K10, 1 When channel 004 ≥ constant K10, 0
Greater than or equal to	.GE.	003.GE.K01	When channel 003 ≥ constant K01, 1 When channel 003 < constant K01, 0
Less than or equal to	.LE.	004.LE.K10	When channel 004 ≤ constant K10, 1 When channel 004 > constant K10, 0

Arithmetic Functions

Type	Operators	Example	Explanation
Absolute value	ABS()	ABS(001)	Finds abs val of measured values on ch 001.
Square root	SQR()	SQR(002)	Finds sqr rt of measured values on ch 002.
Common logarithm	LOG()	LOG(003)	Finds common log of measured data on ch 003.
Exponent	EXP()	EXP(005)	Finds e^x where x is the measured data on ch 005.

TLOG Functions*

The TLOG computation computes the maximum, minimum, maximum-minimum, integral, average, and pulse integral of the specified channel. One function can be used per expression.

Type	Operators	Example	Explanation
Maximum value	TLOG.MAX()	TLOG.MAX(001)	Finds max value of measured values on ch 001.
Minimum value	TLOG.MIN()	TLOG.MIN(002)	Finds min value of measured values on ch 002.
Maximum value to minimum value	TLOG.P-P()	TLOG.P-P(003)	Finds P-P of the measured data on ch 003.
Integral value	TLOG.SUM()	TLOG.SUM(004)	Finds integral val of measured values on ch 004.
Mean value	TLOG.AVE()	TLOG.AVE(005)	Finds the avg value of measured values on ch 005.
Pulse Integration**	TLOG.PSUM()	TLOG.PSUM(011)	Finds the pulse integral of measured values on ch 011.

* The channels that can be specified in TLOG functions are the measurement and MATH channels excluding TLOG.PSUM.

** The channels that can be specified for a TLOG.PSUM computation are the digital input channels.

CLOG Functions*

The CLOG computation computes the maximum, minimum, maximum-minimum, integral, and average values of the specified channel group. One function can be used per expression.

Type	Operators	Example	Explanation
Maximum value	CLOG.MAX()	CLOG.MAX(001-010)	Finds max of measured data on ch 001 to 010.
Minimum value	CLOG.MIN()	CLOG.MIN(001.003)	Finds min of measured data on ch 001 and 003.
Maximum value to minimum value	CLOG.P-P()	CLOG.P-P(002-009)	Finds P-P of the measured data on ch 002 to 009.
Mean. value	CLOG.AVE()	CLOG.AVE(011-020)	Finds avg of measured data on ch 011 to 020.

* The channels that can be specified in CLOG functions are the measurement and MATH channels. (The number of channels which can be specified is to ten channels.)

Conditional Expressions

Type	Operators	Explanation
Conditional expressions	[EXPR1?EXPR2:EXPR3]	Execute expression 2 when expression 1 is true, or expression 3 when it is false

Other

Type	Operator	Explanation
Parentheses	( )	Specifies the order of operations

Order of Operations in Expressions

Expressions are hierarchical according to the table below. The operations are listed in the table from top to bottom in order of precedence. These precedences must be taken into account when writing expressions.

Type	Operators
(High precedence)	
Arithmetic, TLOG, and CLOG functions	ABS(), SQR(), LOG(), EXP(), TLOG.MAX(), TLOG.MIN(), TLOG.P-P(), TLOG.SUM(), TLOG.AVE(), TLOG.PSUM() CLOG.MAX(), CLOG.MIN(), CLOG.P-P(), CLOG.AVE()
Conditional expressions	[EXPR1?EXPR2:EXPR3]
Exponentiation	**
Logical negation	NOT
Multiplication and division	*, /
Addition and subtraction	+, –
Relational operation	.GT., .LT., .GE., .LE.
Equivalence	.EQ., .NE.
Logical product	AND
Logical sum, exclusive OR	OR, XOR
(Low precedence)	

MATH Reference Channels

The following channels can be referenced for data used in computations.

Type	Channel number	Description
Measurement Channel	001 to 060	Data from measurement channels
Computation channels	A001 to A300	Data from MATH channels (Channels A061 to A300 are used for communication input only.)
Communication input channels	C001 to C300	Numerical values in expressions substituted with communication input
Flag input channels	F01 to F60	Set in expressions as the constant 1 or 0
Calculation constant	K01 to K60	Represented as a fixed constant in expressions
Program channels	P01 to P03	Inputs broken line data into expressions

Flag Input Channels

Can be set in expressions as the constant 1 or 0. Normally 0, but turns to 1 upon occurrence of certain events of the Event/Action function.

For example, given the expression:

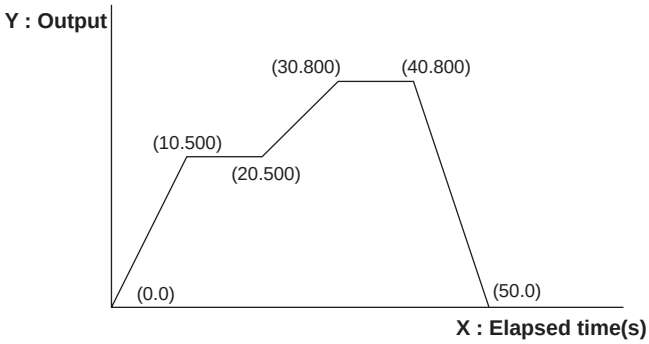
NOTF01 * TLOG.SUM(001)

if the Event action's Edge action is set to FLAG:F01, when the event occurs, F01 becomes 1 and NOTF01 becomes 0, therefore the total of channel 001 is 0.

Program Channels

Up to thirty-two inputs of broken line data can be included in expressions.
Multiple points can be set for the time from the start point and the output value at that point. Specified points are linked with a straight line, the value of Y at the elapsed time X is output. There is SINGLE, in which one cycle is executed, and REPEAT in which execution repeats. By specifying a MATH channel to which broken line input is assigned to the reference channel of an analog output channel, you can output arbitrary patterns.

- Example



- Entry Example
  Input of broken line data in the example is as follows.
  (0.0), (10.500), (20.500), (30.800), (40.800), (50.0), (-1.0)
  If there are fewer than thirty-two setting points, a (-1.0) is required to show the end of the points.
- Operation of program channels for the computation operation

Computation Operation	Program channel operation
Computation start	Starts broken line computation from the held elapsed time
Computation stop	Holds the broken line computed value
Computation clear	0-clear the elapsed time and start the broken line computation from the beginning
Computation reset	During self-computation, 0-clear the elapsed time and start the broken line computation

- Operation after Elapsed Time

Mode	Notation	Program channel operation
Single	SINGLE	Holds the broken line computed value of the last point
Repeat	REPEAT	Returns to the start point then repeats broken line

Computation Operation

Starting and Stopping Computation

Execution of computation starts and stops according to user commands (Start/Stop key, Event/Action function, or monitor screen settings).

Computed Values Clear

Clears all MATH channel data (including MATH alarms) per the Event/Action function, communication commands, or requests from the monitor setting screen.

Computed Value Reset

Clears all MATH channel data (including MATH alarms) per the Event/Action function, communication commands, or requests from the monitor setting screen. If this request occurs during a computation, it is executed on the next computation interval and computation starts. Also, if the request occurs while the computation operation is stopped, it is cleared when computation starts.

Group Reset

Clears all MATH channel data (including MATH alarms) per the Event/Action function or requests from communication commands. If this request occurs during a computation, it is executed on the next computation interval and computation starts. Also, if the request occurs while computation is stopped, it is cleared when computation starts.

Math Groups

Specifies multiple channels from among Math channels 1 through 60. Up to seven groups can be set. Math groups are used with group reset.

Math Interval

Specify one from among the measurement group numbers, and perform computation. Select a group having a measurement interval of 100 ms or higher.
The following conditions apply to the specified measurement group.

- In the selected measurement group, all measurement channels must include an input module with no SKIP channels.
- If there is no input module, or if all channels of the input module are SKIP, you can specify measurement group arbitrarily.
- When multiple measurement groups specify the same measurement interval, specify the measurement group with the largest number.

Math Span

The upper and lower limits for the display of the monitor screen and other items. The specifiable range of numbers is as follows according to the decimal place. If the computed results fall outside of the allowable numerical value setting range, they are displayed on screen as plus over or minus over data.

Decimal Place	Computation span setting range
0	–9999999 to 99999999
1	–999999.9 to 9999999.9
2	–99999.99 to 999999.99
3	–9999.999 to 99999.999
4	–999.9999 to 9999.9999

Handling Units in Computations

In computations, computed values (measured and computed data) are handled as numbers without units. Also, they are unrelated to the math channel units.
Example:
Expression = 001 + 002 + K01
001 (measurement ch 1) = 20 mV, 002 (measurement ch 2) = 30 V, K01 (math constant) = 10
Given the above, the computed result is 60.

TLOG.PSUM Settings

When performing pulse integration at an interval of 10 ms or 50 ms, an input module of 100 ms interval or higher is required in addition to a module enabled for DI input for TLOG.PSUM computation. Also, set the MATH interval to 100 ms or higher.

Alarm Level

You can implement alarm actions based on the computed result. Four levels can be set per channel. Available alarm types are upper limit and lower limit. There is no hysteresis function.

Math Error Data Processing

Processing of measurement channels referenced in expressions and data referenced in math channels is as follows. Note that error data, plus over data, and minus over data can be processed using special MATH items.

Processing upon Math Error

When the computation results in an error, the following choices are available.

Choice for the Computed Result	Notation
Set to plus over	+OVER
Set to minus over	–OVER

Special Math Processing

You can select from the following special math processes for the MATH operation when the reference channel results in an error.

Reference channel	Choice for the Computed Result	Notation
Channel referenced in expression is error data	Set to computation error	ERROR
	Ignored and continue computation	SKIP
Channel referenced in expression is overflow data	Set to computation error	ERROR
	Ignored and continue computation	SKIP
	Replace data with upper or lower limit and continue computation	LIMIT
TLOG.MAX, TLOG.MIN, Channel referenced in the TLOG.P-P expression is overflow data	Plus over	+OVER
	Minus over	–OVER
CLOG.MAX, CLOG.MIN, Channel referenced in the CLOG.P-P expression is overflow data	Calculation Error	ERROR

The upper and lower limits are as follows:

- Measurement channels: Range upper and lower limit
- Linear-scaled measurement channels: Upper and lower limit of scaling
- Computation channels: Upper/lower limit of span

Overflow Processing upon TLOG.PSUM Computation Overflow

You can select an integral value process for when the TLOG.PSUM integral value overflows from the following items.

Choice for the Computed Result	Notation
When 99999999 is exceeded, computation stops as an overflow	OVER
When 99999999 is exceeded, the next count is 0, and computation continues.	ROTATE

TLOG.SUM Computation Integration Units

The units of integration are as follows:

IIntegration Units	Notation	Explanation
No time scale	OFF	Σ (data)*
Every second	SEC	Σ (data)/(Number of times of computing per second.)
Every minute	MIN	Σ (data)/(Number of times of computing per minute.)
Every hour	HOUR	Σ (data)/(Number of times of computing per hour.)

* Integration of data every MATH integral number of times

2.1 Handling Precautions

This section describes the precautions to be taken when using the MW100. Please read before using this product.

- If you are using this instrument for the first time, make sure to thoroughly read the safety precautions given on pages ii and iii.
- Do not remove the case.
  For internal inspection or adjustment, contact your nearest YOKOGAWA dealer.
- Do not place objects on top of the instrument.
  Never place other instruments or objects containing water on top of the instrument. Doing so can lead to malfunction.
- Take proper care when carrying the instrument.
  First, turn off the DUT and the MW100 and remove all cables including measurement wires and communication cables. Then, remove the power cord from the outlet.
- To prevent internal overheating, do not obstruct the vent holes of the modules.
- This instrument uses many plastic parts. When cleaning, wipe using a dry soft cloth. Do not use volatile chemicals since this might cause discoloring and deformation. Doing so can cause discoloring or deformation.
- Do not bring charged objects near the signal terminals. Doing so can lead to malfunction.
- Do not pour volatile agents on the MW100 or leave it in contact with rubber or PVC products for an extended time. Doing so can lead to malfunction.
- Do not apply shock to the instrument.
- When not in use, make sure to turn OFF the power.
- If there are any symptoms of trouble such as smoke, strange orders, or strange sounds coming from the instrument, immediately turn OFF the power and shut off the power supply. Contact your dealer immediately.
- Handle the power cord correctly.
  Nothing should be placed on top of the power cord. The power cord should also be kept away from any heat sources. When unplugging the power cord from the outlet, never pull by the cord itself. Always hold and pull by the plug. If the cord is damaged, contact your dealer for replacement. When ordering, see page vi for the power cord part number.

2.2 Installation

Installation Location

Install the instrument indoors in the following locations.

- **In temperatures of –20 to 60°C**
  If the ambient temperature is –20 to 40°C, place the instrument in a location where the humidity is 20 to 80% RH. For 40 to 50°C, the humidity should be 10 to 50%. For 50 to 60°C, the humidity should be 5 to 30%. However, no condensation should be present. Also note that the temperature range of certain modules is –20 to 50°C.

Note

Condensation may occur if the instrument is moved to another place where the ambient temperature is higher, or if the temperature changes rapidly. Measurement errors can occur when using thermocouple input. In this case, let the instrument adjust to the new environment for at least one hour before using the instrument.

- **Locations where the operating altitude is 2,000 m or less**
- **Well-ventilated locations**
  Install the instrument in a well-ventilated location to prevent the temperature inside the instrument from rising.
- **Location where mechanical vibration is small**
  Select a location with small mechanical vibration for installation.
- **Horizontal location**
  Install the instrument on a flat, even surface.

Do not install the instrument in the following places.

- **Dangerous locations where flammable liquids, vapors, or dust is present**
- **In direct sunlight or near heat appliances**
  Select a location with the smallest fluctuation from room temperature (23°C) as possible. Placing the instrument in direct sunlight or near heat appliances can cause adverse effects.
- **Where an excessive amount of soot, steam, humidity, dust, or corrosive gas is present**
  Soot, steam, humidity, dust, and corrosive gas can cause adverse effects on the instrument. Avoid installing the instrument in an environment with a high level of such substances.
- **Near magnetic field sources**
  Install the instrument in a location where the magnetic field is 400 A/m or less. Avoid bringing instruments that produce magnetic fields or magnets near this instrument. Using the instrument near a strong magnetic field source can cause measurement errors.

Installation Procedures

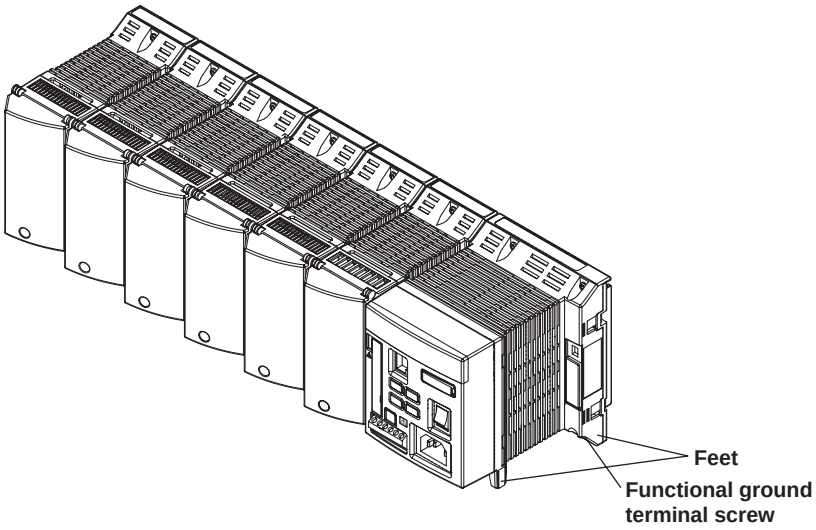
CAUTION

When attaching the instrument to DIN rails, use metal plates at least 2 mm thick in three places to secure the unit and prevent it from falling.

The MW100 Data Acquisition Unit can be used on the desktop, placed on a floor, rack mounted, or panel mounted. In all cases, be sure to install the instrument in a vertical position.

Placing on a Desktop or on the Floor

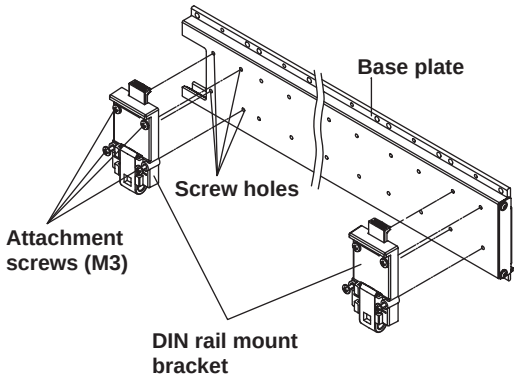
Since each module has feet you can attach the necessary modules to the base plate allowing the unit to be placed vertically. For the procedure for attaching the modules, see the next page.



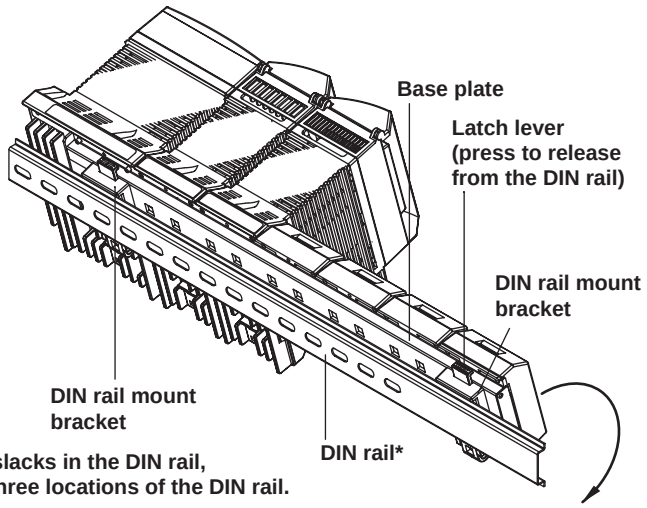
Attaching to DIN Rails

By attaching DIN rail mounting brackets to the base plate as in the figure below, you can rack-mount or panel-mount the MW100 Data Acquisition Unit.

• Attachment of the DIN rail mount bracket to the base plate

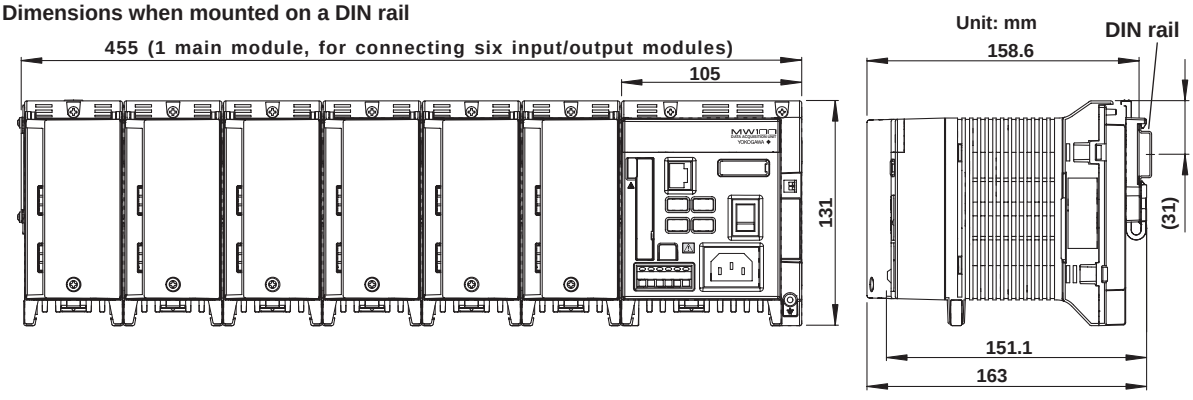


• Attachment of the base plate to the DIN rail



* To prevent slacks in the DIN rail, fix at least three locations of the DIN rail.

• Dimensions when mounted on a DIN rail



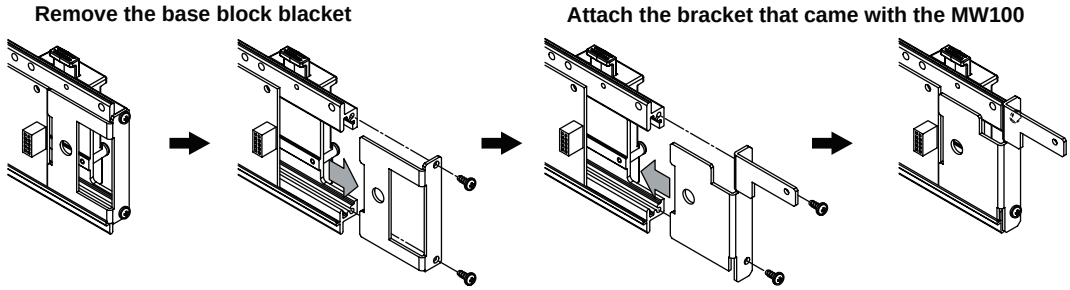
2.3 Attaching the Modules

WARNING

To prevent electric shock and instrument breakdown, do not connect the power supply to the main module when attaching modules.

Preparing the Base Plate

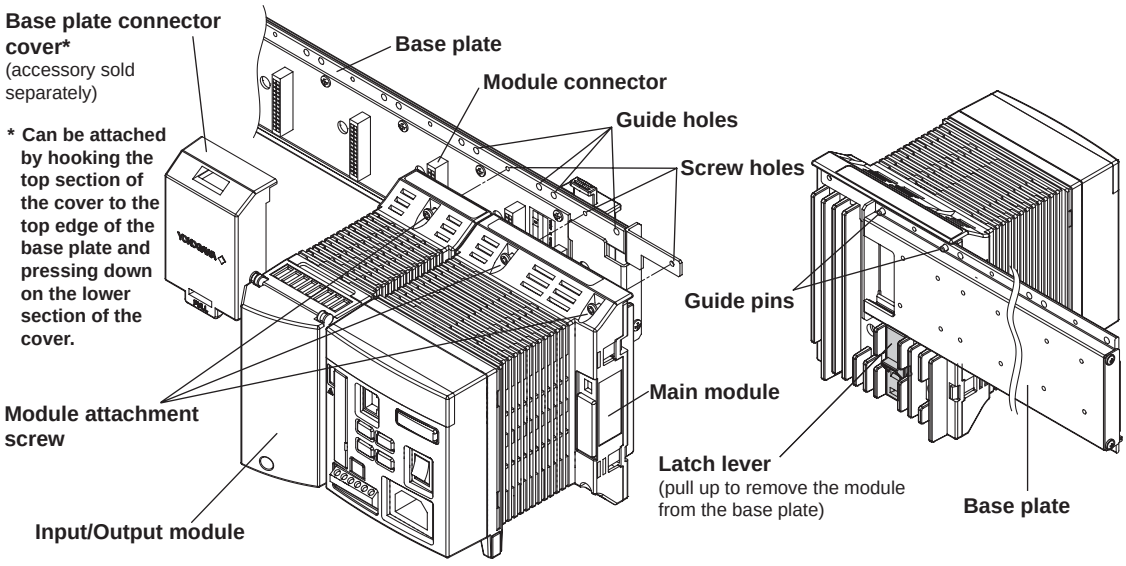
The accessory brackets are attached in order to attach the MW100 main module to the base plate.



Attachment Procedure

1. Check that the power supply is not connected to the main module.
2. Align the connector on the rear panel of the module to the connector at the desired position of the base plate and insert the connector.
   When the connectors are correctly connected, the guide pin on the rear panel of the module is inserted into the guide hole on the base plate. In addition, the module is secured to the base plate with the latch lever locking in place at the bottom section of the base plate.
3. Fasten with two screws (M3) at the top of the main module, and one screw at the top of the input/output modules. The main module can only be attached to the right side of the base plate.

To remove the module, loosen the attachment screw, pull down on the latch lever on the rear panel of the module, and pull the module straight from the base plate.


Base plate connector cover*
(accessory sold separately)
* Can be attached by hooking the top section of the cover to the top edge of the base plate and pressing down on the lower section of the cover.
Base plate
Module connector
Guide holes
Screw holes
Guide pins
Main module
Module attachment screw
Input/Output module
Latch lever
(pull up to remove the module from the base plate)
Base plate

Attachment Positions and Channel Numbers

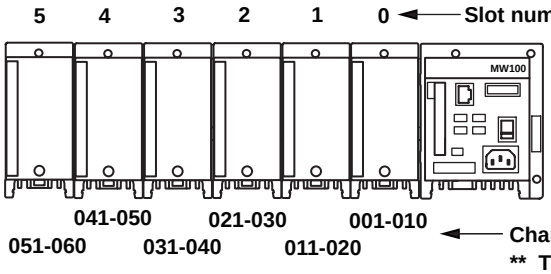
Channel numbers are recognized as follows:

- Browser monitor and commands
  Channel numbers within units. Example: CH001
- Data Viewer software
  Unit number + Channel number within units. Example: CH01001

Representation of channel numbers: □□ □□□

Channel numbers in a unit (001-060)

Unit number (00-89)



** The last one digit on a 4-channel module is 1 to 4.
The last one digit on a 6-channel module is 1 to 6.
The last one digit on a 8-channel module is 1 to 8.

2.4 Connecting Signal Wires

Terminal Arrangement Markings on the Terminal Cover

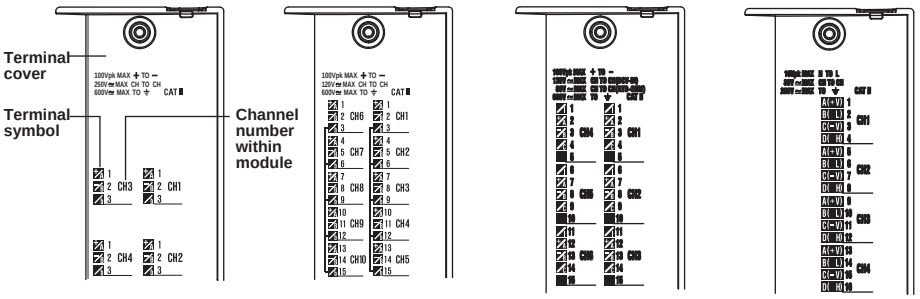
Characters indicating the terminal function and a terminal symbol indicating the type of signal to be input/output to each terminal are written on the back of the terminal cover of each I/O module. For information on wiring of corresponding terminal signals, see the wiring procedures in this section. The 4-CH Medium-Speed Strain Module (-NDI) does not have a terminal cover.

4-CH, High-Speed Universal Input Module

10-CH, Medium-Speed Universal Input Module

6-CH, Medium-Speed 4-wire RTD Resistance Input Module

4-CH, Medium-Speed Strain Input Module (-B12, -B35)

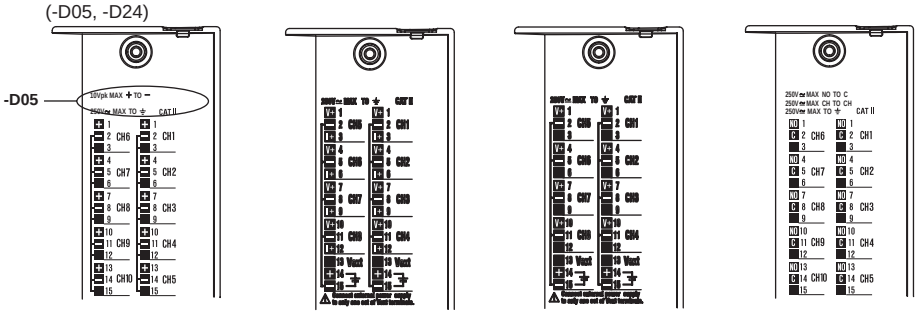


10-CH, High-Speed Digital Input Module (-D05, -D24)

8-CH, Medium-Speed Analog Output Module

8-CH, Medium-Speed PWM Output Module

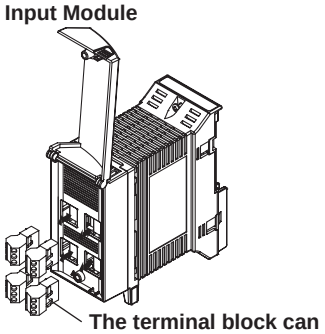
10-CH, Medium-Speed Digital Output Module



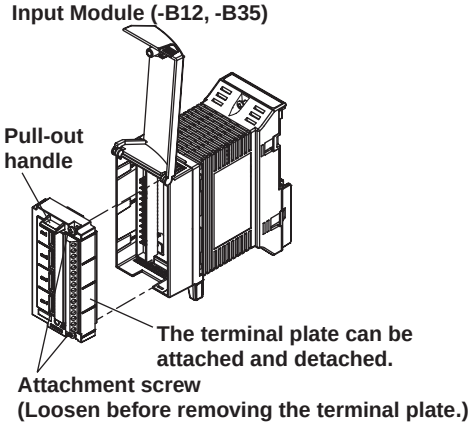
Attaching and Removing the Terminal Block

The I/O terminals can be removed as shown in the figure below.
Also, when the terminal cover is flipped up, you can remove it by forcing it back.

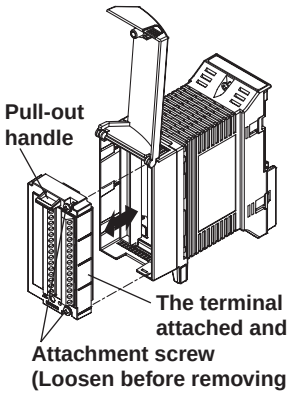
4-CH, High-Speed Universal Input Module



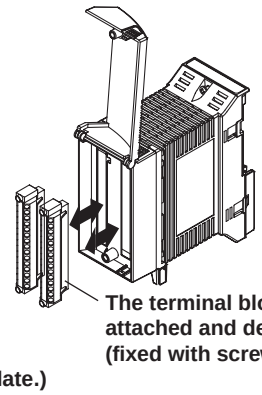
4-CH, Medium-Speed Strain Input Module (-B12, -B35)


Pull-out handle
The terminal plate can be attached and detached.
Attachment screw
(Loosen before removing the terminal plate.)

**10-CH, Medium-Speed Universal Input Module/
6-CH, Medium-Speed 4-wire RTD Resistance Input Module/
10-CH, High-Speed Digital Input Module
(-D05, -D24)**


Pull-out handle
The terminal plate can be attached and detached.
Attachment screw
(Loosen before removing the terminal plate.)

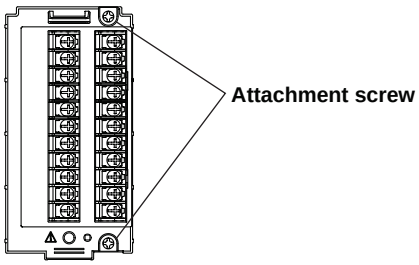
**8-CH, Medium-Speed Analog Output Module/
8-CH, PWM Output Module/
10-CH, Medium-Speed Digital Output Module**



Attaching the Screw Terminal Plate

A screw terminal plate (model 772080, sold separately) can be attached to the 10-CH Medium Speed Universal Input Module and the 10-CH High Speed Digital Input Module. The screw terminal plate is attached and removed in the same manner as the screw terminal block. Note that the terminal arrangement is different than that of the clamp terminal plate. The proper arrangement is shown on the back of the terminal covers, so be sure to replace the cover along with the terminal plate. For details, see “Handling the MX100/MW100 10-CH Screw Terminal Plate” in IM MX100-77E.

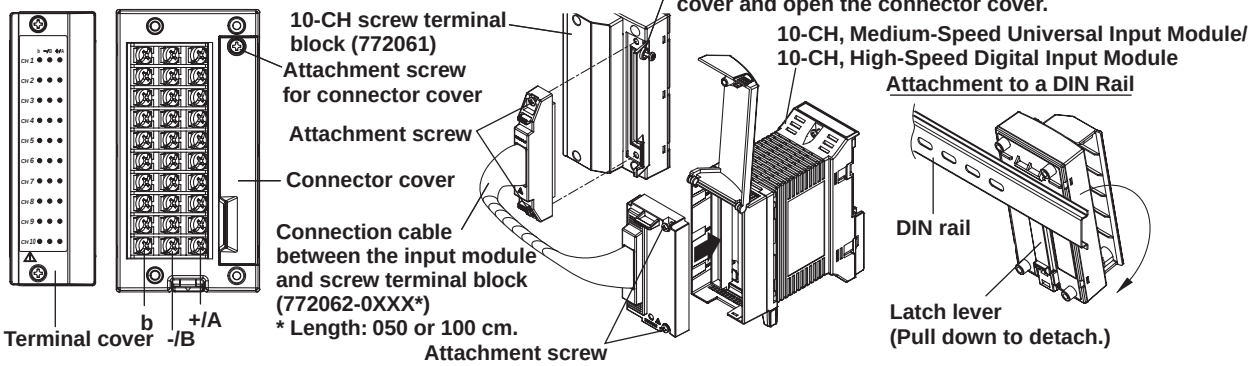
Screw terminal plate



Screw Terminal Block

The 10-CH, Medium-Speed Universal Input modules and 10-CH, High-Speed Digital Input modules allow you to remove the terminal plate and connect a 10-channel screw terminal block (accessory sold separately, M4 screws) that can be attached to a DIN rail (see the figure below).

10-CH screw terminal block (772061)


10-CH screw terminal block (772061)
Attachment screw for connector cover
Attachment screw
Connector cover
Connection cable between the input module and screw terminal block (772062-0XXX*)
* Length: 050 or 100 cm.
Terminal cover
b
-/B
+/A
Loosen the attachment screw for the connector cover and open the connector cover.
10-CH, Medium-Speed Universal Input Module/
10-CH, High-Speed Digital Input Module
Attachment to a DIN Rail
DIN rail
Latch lever
(Pull down to detach.)
Attachment screw

General Precautions When Wiring the Input/Output Signal Wires

WARNING

- To prevent the possibility of electric shock when wiring, confirm that the power supply source and signal source are turned OFF. After making the connections, secure the terminal cover and do not touch the terminals with your hands.
- For signal wires on which voltage exceeding 30 VAC / 60 VDC is applied relative to the ground potential or between signals, use reinforced (double) insulation wires. For all other signal wires, use basic insulation wires. For the withstand voltage of insulation wires, see the table below.

Applied Voltage (Vrms or VDC)	Basic Insulation	Double (reinforced) insulation
30(60VDC) to 100	620 Vrms	1000 Vrms
101 to 150	840 Vrms	1400 Vrms
151 to 300	1390 Vrms	2300 Vrms
301 to 600	2210 Vrms	3700 Vrms

- To avoid electric shock when removing the terminal plate or block and wiring the terminals, attach the terminal block or plate to the input output module before inputting or outputting signals. Electric shock or fire can result if signals are applied to the terminals if the terminal block is removed from the input/output modules.
- When wiring to the screw terminal plate or screw terminal block, use round, insulation coated crimp-on lugs on the terminals (for 4-mm screws on the screw terminal block, or 3-mm screws on the screw terminal plate) that do not come out when loose.
- To prevent fire, use signal wires of the following temperature ratings.

Module Type	Temp. Rating
Screw terminal	75°C
Analog output module, PWM output module signal wires	85°C
Universal input module, digital input module, digital output module, 4-wire RTD resistance input/output module, strain input module	80°C

CAUTION

- If a large pulling force is applied to the input/output signal wires connected to the MW100, the terminal or signal wire may break. To prevent this from happening, secure all the wiring cables to the installation panel.
- Wiring of the Strain Input Module (-NDI)
  When connecting a bridge head, in order that the empty weight of the cable does not exceed 5 kg, ensure that the cable does not hang down more than 1.5 m (the distance to the floor). If the cable hangs longer than 1.5 m, secure the cable to the installation panel or some other location.
- Do not apply a voltage exceeding the value indicated below to the input terminals of the universal input modules. Doing so can damage the modules.
  - Maximum input voltage
    Voltage range less than or equal to 1 VDC, TC, RTD, and DI: ±10 VDC
    Other voltage ranges: ±120 VDC
  - Maximum common mode voltage: 600 VACrms (50 / 60 Hz)

- Do not apply a voltage exceeding the value indicated below to the input terminals of the 10-CH High-Speed Digital Input Module and the output terminals of the 10-CH Medium-Speed Digital Output Module. Doing so can damage the modules.
  - Maximum input voltage
    10-CH, High-Speed Digital Input module: ±10 VDC (-D05), ±50 VDC (-D24)
    10-CH, Medium-Speed Digital Output module: 250 VAC or 250 VDC
  - Maximum common mode voltage: 250 VACrms (50/60 Hz)
- Do not apply a voltage exceeding the value indicated below to the input terminals of the 4-Wire RTD resistance input module. Doing so can damage the modules.
  - Maximum input voltage
    Voltage range less than or equal to 1 VDC, RTD, resistance, and DI (contact): ±10 VDC
    Other measuring ranges: ±120 VDC
  - Maximum common mode voltage: 600 VACrms (50/60 Hz)
- Do not apply a voltage exceeding the value indicated below to the input terminals of the strain input modules. Doing so can damage the modules.
  - Maximum input voltage: ±10 VDC (between H-L) continuous
  - Maximum common-mode voltage
    Between input and ground: 250 VACrms (-B12, -B35), 30 VACrms (-NDI)
- Do not apply a voltage exceeding the value indicated below to the input terminals of the analog output modules or the PWM output modules. Doing so can damage the modules.
  - Maximum common-mode voltage
    Between output terminals and earth terminal: 250 VACrms (50/60 Hz)
- This is a measurement category II (IEC61010-1) and overvoltage category II (CSA1N.61010-1) instrument.

Consider the points indicated below to prevent noise from entering the measurement circuit. For information about measures against noise, see section 2.10, "Measures against Noise on the MW100 Data Acquisition Unit."

- Keep the measurement circuit away from the power supply cable (power supply circuit) and ground circuit.
- It is desirable that the object under measurement is not a noise source. However, if this is not avoidable, insulate the object under measurement and the measurement circuit. In addition, ground the object under measurement.
- Shielded wires are effective against noise caused by electrostatic induction. As necessary, connect the shield to the ground terminal of the MW100 (make sure this does not lead to grounding at two points).
- Twisting the measurement circuit wires at short intervals is relatively effective against noise caused by electromagnetic induction.
- The protective earth ground must be connected to low ground resistance (100 Ω or less).

When using the reference junction compensation of the MW100 through thermocouple input, take measures to stabilize the temperature at the terminal section.

- Always close and secure the terminal cover.
- Do not use thick wires with high heat radiation effect (cross-sectional area of 0.5 mm^2 or smaller recommended).
- Keep the ambient temperature consistent. Large temperature fluctuation occurs such as when a fan nearby is turned ON/OFF.

Connecting the input wires in parallel with other instruments may mutually affect the measured values. If you need to make a parallel connection:

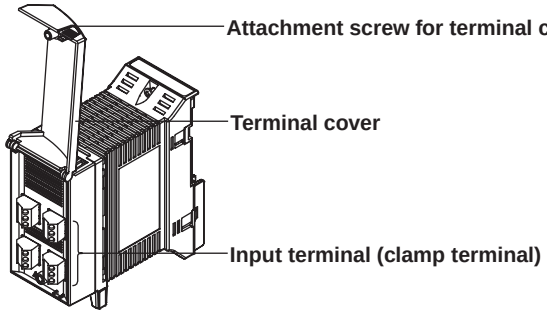
- Turn OFF burnout.
- Ground each instrument at a single common point.
- Do not turn ON/OFF the instrument while measurement is in progress. It may cause adverse affects on the other instrument.

Note that RTDs and resistors cannot be connected in parallel.

Wiring Procedures

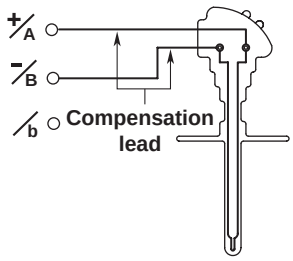
1. Turn OFF the power to the instrument.
2. Loosen the terminal cover attachment screw and lift up the terminal cover.
3. Connect the signal wires to the terminals.
4. Return the terminal cover to the original position and secure it with the screw.

4-CH, High-Speed Universal Input Module

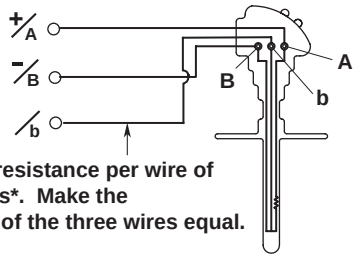


Wiring the Universal Input Module

• Thermocouple input



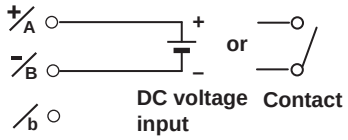
• RTD input



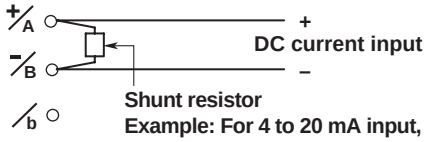
Lead wire resistance per wire of 10 Ω or less*. Make the resistance of the three wires equal.

*** In the case of Pt100Ω. 5 Ω max for Pt50Ω. 1 Ω max. for Cu10 Ω.**

• DC voltage input/DI input (contact)



• DC current input



Example: For 4 to 20 mA input, shut resistance values should be 250 Ω±0.1%.

Terminal type: Clamp

Applicable wire size: For -H04, 0.2 to2.5 mm^2 (AWG24 to12)

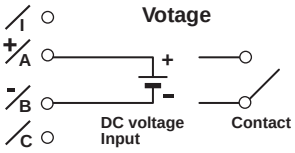
For -M10, 0.14 to 1.5 mm^2 (AWG26 to 16)

Note

- With the 10-CH Medium-Speed Universal Input module, the A and B RTD input terminals are insulated on each channel, but terminal b is shorted internally on all channels.
- When the screw terminal plate (model 772080) is connected to the 10-CH Medium-Speed Universal Input Module, the terminal arrangement differs from that of clamp terminals, so wire according to the markings on the terminal cover.

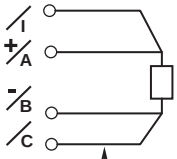
Wiring the 4-Wire RTD Resistance Input Module

• DC voltage input/DI (contact) input



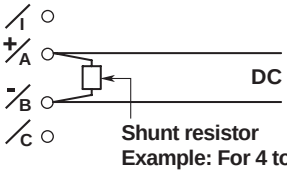
Nothing connected to the I or C terminal

• RTD input, resistance input



Resistance per lead wire of 10 Ω or less

• DC current input

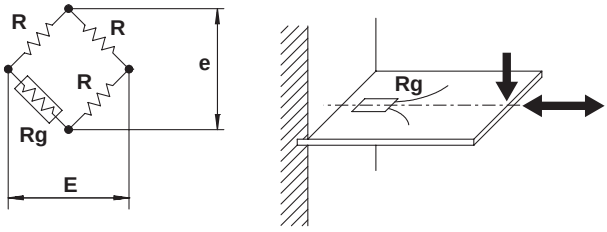


Shunt resistor
Example: For 4 to 20 mA input, shut resistance values should be 250 Ω±0.1%.

Terminal type: Clamp
Applicable wire size: 0.14 to 1.5 mm^2 (AWG26 to 16)

Wiring the Strain Input Module

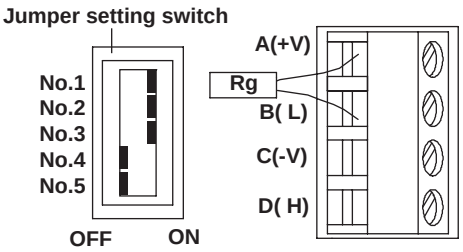
• 1 Gauge Method



R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge

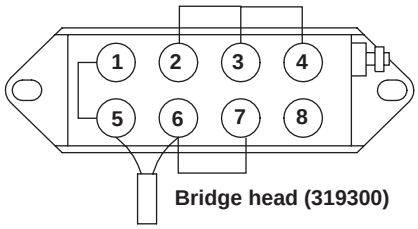
-B12, -B35

Jumper setting switch



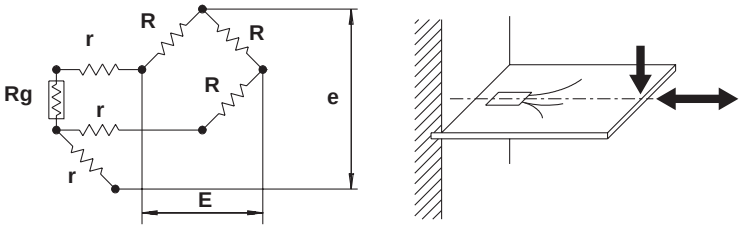
No.1	No.2	No.3	No.4	No.5
ON	ON	ON	OFF	OFF

-NDI



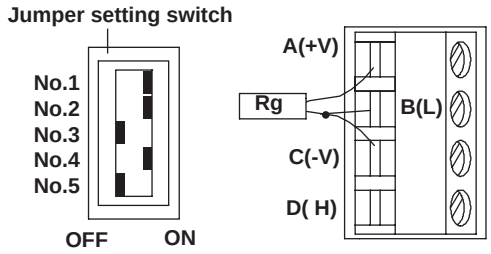
Bridge head (319300)

• 1 Gauge 3 Wire Method



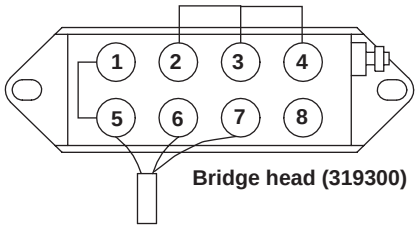
R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge

-B12, -B35

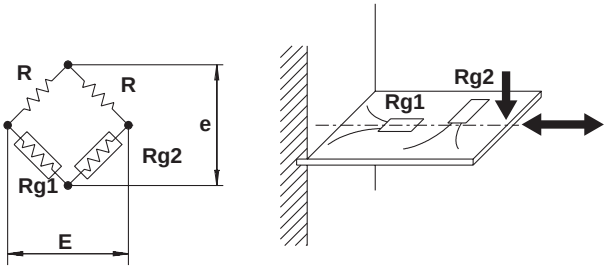


No.1	No.2	No.3	No.4	No.5
ON	ON	OFF	ON	OFF

-NDI

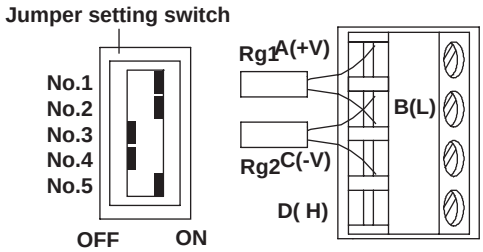


- **Adjacent 2 Gauge Method**



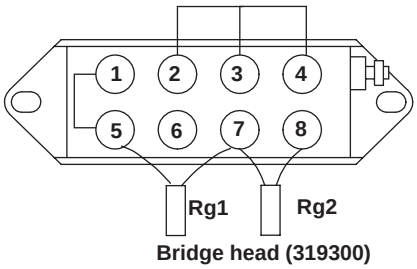
R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge

-B12, -B35

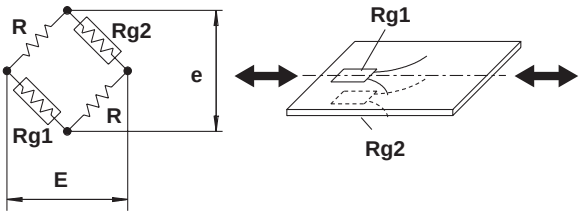


No.1	No.2	No.3	No.4	No.5
ON	ON	OFF	OFF	ON

-NDI

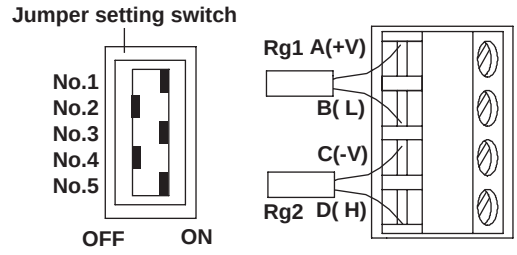


- **Opposing 2 Gauge Method**



R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge

-B12, -B35

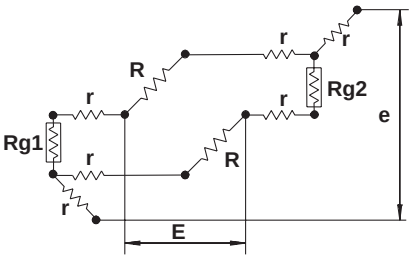


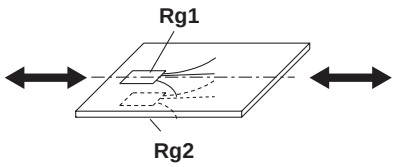
No.1	No.2	No.3	No.4	No.5
ON	OFF	ON	OFF	ON

-NDI

319300 dose not support the opposing 2-gauge method.

- **Opposing 2 Gauge 3 Wire Method**



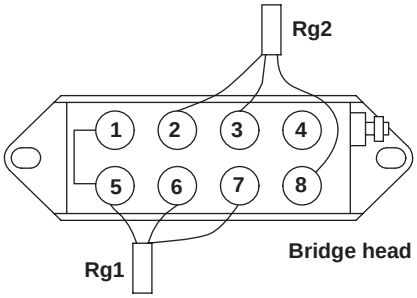


R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge

-B12, -B35

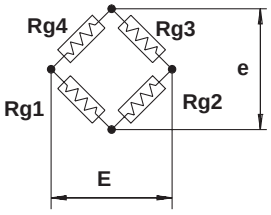
Cannot be connected. Use -NDI.

-NDI

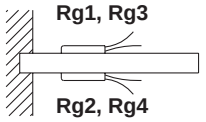


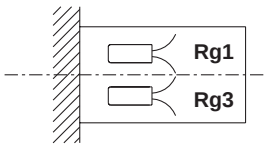
Bridge head (319300)

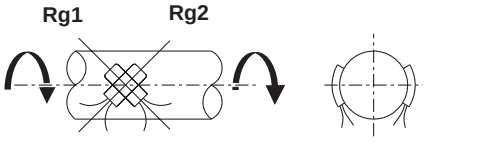
- **4 Gauge Method**



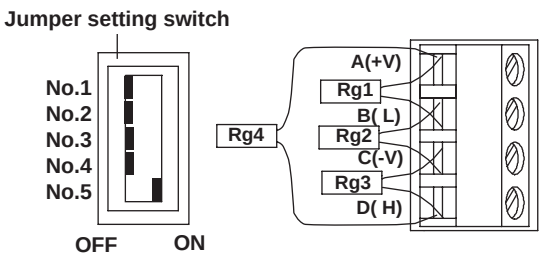
R: fixed resistance
r: resistance value of lead wire
Rg: resistance value of strain gauge
e: output voltage from bridge
E: voltage applied to bridge





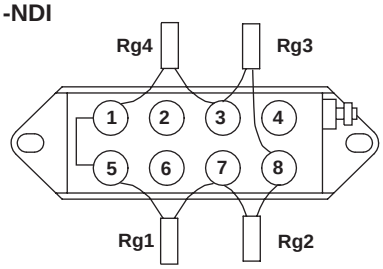


-B12, -B35



No.1	No.2	No.3	No.4	No.5
OFF	OFF	OFF	OFF	ON

-NDI



Bridge head (319300)

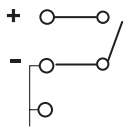
Wiring Digital Input Modules

Note

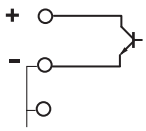
- With digital input modules, the (–) terminal and open terminals on all channels are shorted internally.
- When the screw terminal plate (model 772080) is connected to the Digital Input Module, the terminal arrangement differs from that of clamp terminals, so wire according to the markings on the terminal cover.

Wiring with the -D05 Option

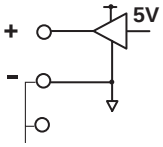
• Contact input



• Transistor input



• 5V logic input

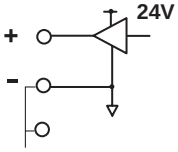


Main Input Specifications (-D05)

Input type:	DI (non-voltage contact, open collector, and 5-V logic)
Input format:	Pull up at approx. 5 V/approx. 5 kΩ, common potential between channel
Min. detection pulse width:	Twice the sampling interval or more
Input threshold level:	No-voltage contact, open collector: 100 Ω or less, ON, 100 kΩ or less, OFF 5-V logic: OFF at 1 V or less and ON at 3 V or greater
Contact/Transistor rating:	Contact with a rating of 15 VDC or greater and 30 mA or greater Transistor with a rating of Vce > 15 VDC and Ic > 30 mA
Terminal type:	Clamp
Applicable wire size:	0.14 to 1.5 mm^2 (AWG26 to 16)

Wiring with the -D24 Option

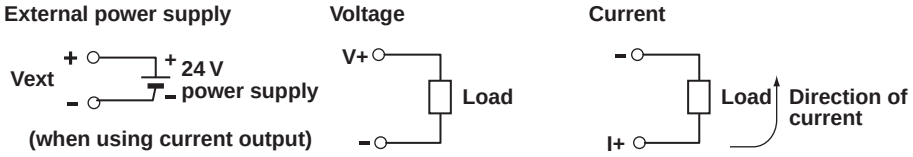
• 24 V logic input



Main Input Specifications (-D24)

Input type:	DI (24-V logic)
Input format:	Common potential between channel
Min. detection pulse width:	Twice the sampling interval or more
Input threshold level:	24-V logic: OFF at 6 V or less and ON at 16 V or greater
Terminal type:	Clamp
Applicable wire size:	0.14 to 1.5 mm^2 (AWG26 to 16)

Wiring with the Analog Output Module



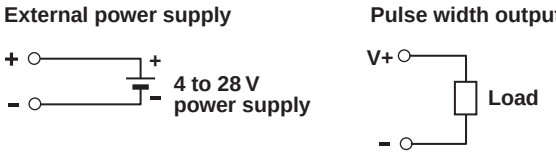
CAUTION

Two power supply terminals are connected internally. Therefore, do not connect a separate external power supply to them. Fire can result.

Main Output Specifications

Terminal type: Clamp, attached and removed in units of 4 channels
Load impedance: Voltage 5 kΩ or more
Current 600 Ω or less.
Applicable wire size: 0.08 to 2.5 mm^2 (AWG28 to 12)

Wiring with the PWM Output Module



CAUTION

Two power supply terminals are connected internally. Therefore, do not connect a separate external power supply to them. Fire can result.

Main Output Specifications

Output capacity: 1A/ch max, however, 4 A or less total for all modules*, **
Terminal type: Clamp, attached and removed in units of 4 channels
Applicable wire size: 0.08 to 2.5 mm^2 (AWG28 to 12)

* A 1A current limit circuit is built in to the output circuit. Once the current limit circuit is ON, the circuit continues to operate unless the external power supply is turned OFF.

** This module has a built-in fuse. The built-in fuse protects against fires or abnormal emissions of heat due to load shortages or other abnormalities. It does not protect against damage to internal circuits.

Wiring with the Digital Output Module

Main Output Specifications

Contact mode: A contact (SPST)
Contact capacity: 250 VDC/0.1 A, 250 VAC/2 A, or 30 VDC/2 A (resistance load)
Terminal type: Clamp, attached and removed in units of 5 channels
Applicable wire size: 0.08 to 2.5 mm^2 (AWG28 to 12)

Note

Do not connect anything to the empty terminals of the digital output module.

2.5 Connecting the Power Supply and Turning the Power Switch ON and OFF

Connections with the Power Cord (Power Supply/Cord Basic Specification Code -1M)

WARNING

- To prevent the possibility of electric shock when wiring, confirm that the power supply source is turned OFF.
- To prevent shock or fires, only use the power cord supplied by Yokogawa together with the MW100 Data Acquisition Unit.
- Make sure to perform protective earth grounding to prevent electric shock. Connect the MW100 Data Acquisition Unit power cord into a three-prong electrical outlet with a protective grounding terminal. The AC outlet must be of a three-prong type with a protective earth ground terminal.
  Also, do not use the functional ground terminal (see 2.2, “Installation” as a protective ground terminal.
- Do not use an extension cord without protective earth ground. Otherwise, the protection function will be compromised.

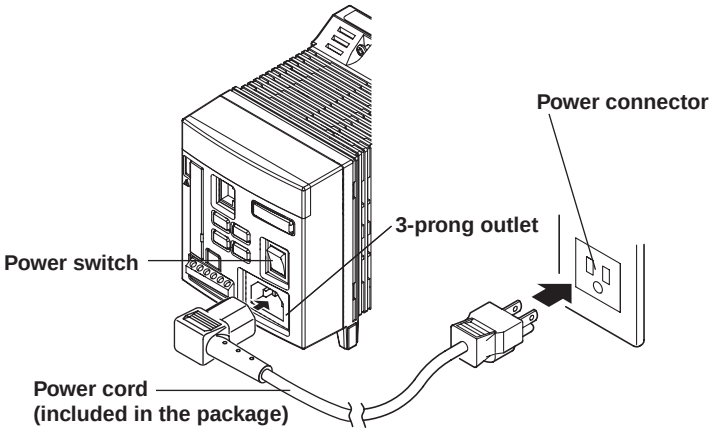
Use a power supply that meets the conditions indicated below.

Item	Specifications
Rated supply voltage	100 to 240 VACrms
Supply voltage range used	AC power supply, 90 to 250 VACrms
Rated supply voltage frequency	50/60 Hz
Allowable line frequency range	50/60 Hz ±2%
Maximum power consumption	Up to approximately 70 VA maximum when six modules are used

Note

Do not use a supply voltage in the range 132 to 180 VAC, as this may have adverse effects on the measurement accuracy.

1. Check that the power switch of the main module is OFF.
2. Connect the accessory power cord plug to the power connector of the MW100 Data Acquisition Unit.
3. (Use the power cord that came with the package.) Connect the plug on the other end of the power cord to the outlet that meets the conditions above. The AC outlet must be of a three-prong type with a protective earth ground terminal.



Wiring the Power Supply Terminal (Power Supply/Cord Basic Specification Code -1W)

WARNING

- Furnish a switch (double-pole type) to separate the unit from the main power supply in the power supply line. Also, include an ON/OFF indicator with the switch as well as a display that acts as a power supply shut down for the instrument.
  Switch specifications
  Steady state current rating: 3 A or more
  Inrush current rating: 100 A or more
  Conforms with IEC60947-1 and -3
- Connect a fuse of 2 A to 15 A to the power supply line.
- Do not insert a switch or fuse on the ground line.

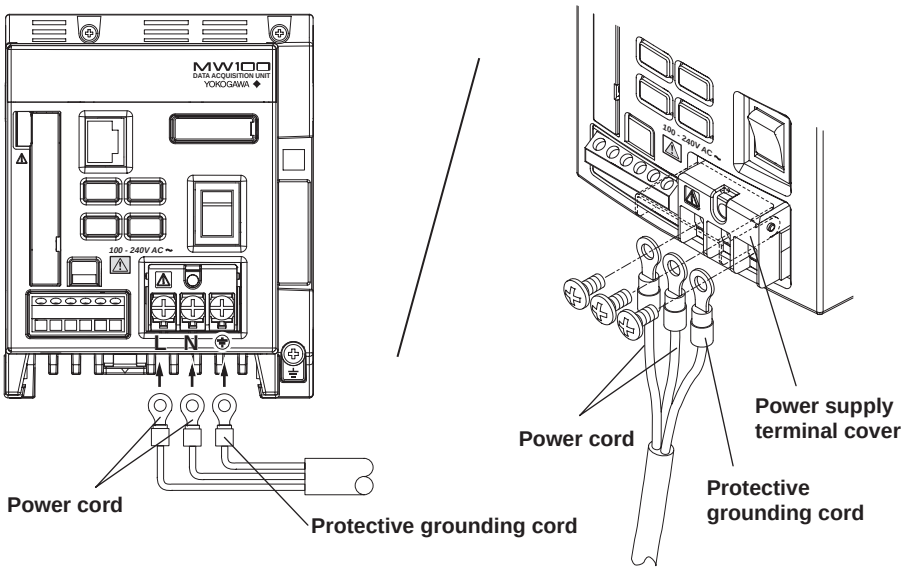
Use a power supply that meets the conditions indicated below.

Item	Specifications
Rated supply voltage	100-240 VACrms
Supply voltage range used	AC power supply, 90 to 250 VACrms
Rated supply voltage frequency	50/60 Hz
Allowable line frequency range	50/60 Hz ±2%
Maximum power consumption	Up to approximately 70 VA maximum when six modules are used

Note

Do not use a supply voltage in the range 132 to 180 VAC, as this may have adverse effects on the measurement accuracy.

1. Check that the power supply and the power switch of the main module is OFF.
2. Loosen the screw fixing the power supply terminal cover of the main module in place and open the power supply terminal cover.
3. Connect the power cord and the protective ground cord to the power supply terminals according to the figure below.
   Use round crimp-on lugs with isolation sleeves (for 4 mm screws) for the power cord and protective ground cord terminals.
4. Close the power supply terminal cover and secure it with the screw.



Wiring the Power Supply Terminal (Power Supply/Cord Basic Specification -2M or -3W)

When using an AC adapter for the power supply

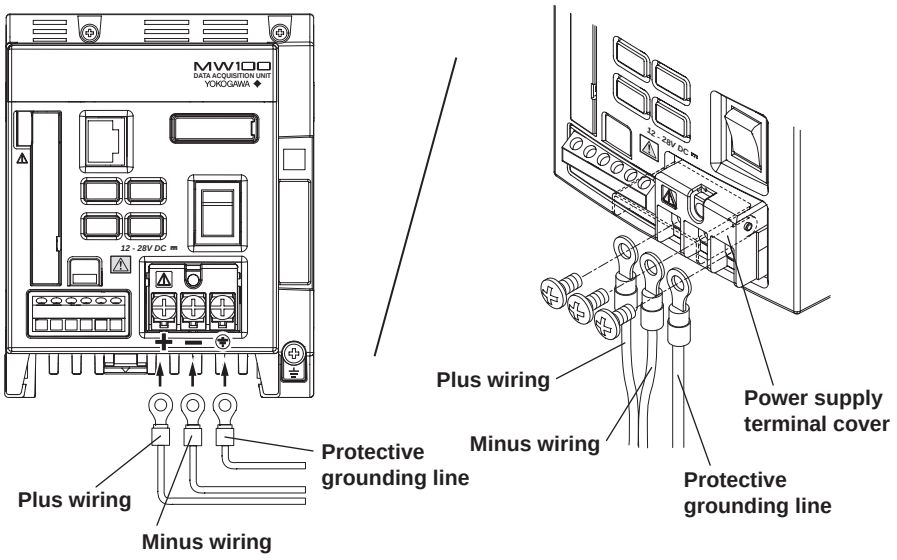
WARNING

- To prevent the possibility of electric shock when wiring, confirm that the power supply source is turned OFF.
- Use the power cord supplied by Yokogawa with the instrument.
- Check that the supply voltage matches the rated voltage of the AC adapter before connecting the power cord.
- During periods of extended non-use, remove the AC adapter's power cord from the AC outlet.
- Do not use an AC adapter (model:772075) other than the one supplied by YOKOGAWA.
- Nothing should be placed on top of the AC adapter power cord. The power cord should also be kept away from any heat sources.
- When unplugging the power cord from the outlet, never pull by the cord itself. Always hold and pull by the plug. If the power cord is damaged, contact your dealer for replacement.

Use a power supply that meets the conditions indicated below.

Item	Specifications
Rated supply voltage	100 to 240 VACrms
Supply voltage range used	AC power supply, 90 to 250 VACrms
Rated supply voltage frequency	50/60 Hz
Allowable line frequency range	50/60 Hz ±2%
Maximum power consumption	Up to approximately 70 VA maximum when six modules are used

1. Check that the power supply and the power switch of the main module is OFF.
2. Loosen the screw fixing the power supply terminal cover of the main module in place and open the power supply terminal cover.
3. Connect the plus (red) and minus (black) wires from the AC adapter and the protective ground wire to the power supply terminal as in the figure below.
4. Close the power supply terminal cover and secure it with the screw.



When Using a DC Power Supply

WARNING

- To prevent the possibility of electric shock when wiring, confirm that the power supply source is turned OFF.
- To avoid electric shock or fire, use electric wires having a cross sectional area of 0.3 mm^2 (AWG 22) or more.

1. Check that the power supply and the power switch of the main module is OFF.
2. Loosen the screw fixing the power supply terminal cover of the main module in place and open the power supply terminal cover.
3. Following the wiring diagram (see “When Using an AC Adapter” in this section), wire the plus/minus wires from the DC power supply and the protective grounding wire to the power supply terminal.
4. Close the power supply terminal cover and secure it with the screw.

Use a power supply that meets the conditions indicated below.

Item	Specifications
Rated supply voltage	12 to 28 VDC
Supply voltage range used	DC power supply: 10 to 32 VDC
Maximum power consumption	Up to approximately 35 VA maximum when six modules are used

Turning the Power Switch ON and OFF

Pressing the “I” side of the power switch turns the instrument ON. Pressing the “O” side turns the instrument OFF.
When turned ON, the 7-segment LED (see section 1.3, “Functions of the Main Module” illuminates. When the self check and other processes are complete, the unit number is displayed.

Note

- Before turning the power ON, check that the modules are attached correctly and that the power cord is connected correctly.
- If the 7-segment LED does not illuminate even if the power switch is turned ON, turn OFF the power switch, then check the items below. If the condition does not change when turning ON the power even after checking those items, it is probably a malfunction. Contact your nearest YOKOGAWA dealer for repairs.
  - That the power cord is plugged in properly.
  - That the power supply voltage is within the allowable voltage range specified in this section
- If the 7-segment LED displays something other than a unit number when the power switch is turned ON, see section 4.1, “Error Display on the 7-Segment LED and Corrective Actions” and carry out the specified corrective action. If the displayed information does not change even when you carry out the corrective action, it is probably a malfunction. Contact your nearest YOKOGAWA dealer for repairs.

2.6 Connecting the Ethernet Cable

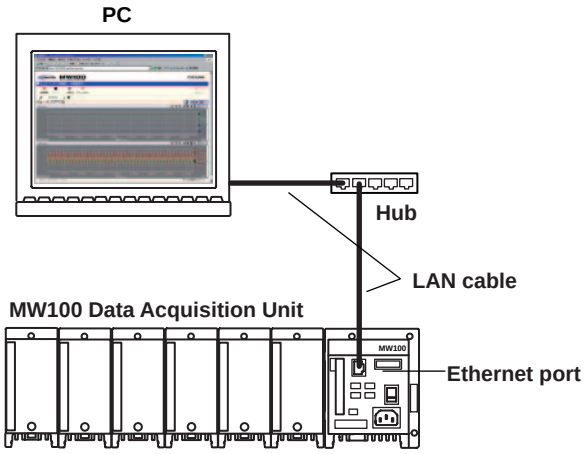
Connection Procedure

Connector

Connect the Ethernet cable to the Ethernet port on the main module.

Connection to the PC

Make the connection via a hub. For a one-to-one connection with a PC, make the connection as shown in the figure below. In the same manner, you can connect multiple MW100 Data Acquisition Units to a single PC.



Checking the Communication Status

You can check the status on the two LEDs at the upper-right and lower-right of the Ethernet port.

For the LED indications, see section 1.3, “Functions of the Main Module.”

Initializing Settings

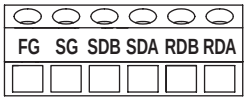
Use dip switch 1 on the main module to initialize settings including the IP address assigned to the MW100.

1. Turn OFF the power to the MW100.
2. Check that the switch 5 of dip switch 1 on the main module is OFF.
3. Turn OFF the power to the MW100.
   After the 7-segment LED indicates the power ON self check, “bF” is displayed.
4. Check the status of step 3, then turn the power OFF.
5. Turn switch 5 of dip switch 1 back ON.
   Check that the settings were initialized by using the IP setting software (accessory).

For information on the indications of the dip switches and the power ON self check, see section 1.3, “Functions of the Main Module.”

2.7 Connecting the RS-422A/485 Interface (/C3 Option)

Terminal Wiring and Signal Names



SERIAL COMM

FG (Frame Ground)	Case grounding for the main unit.
SG (Signal Ground)	The signal ground.
SDB (Send Data B)	Send data B(+).
SDA (Send Data A)	Send data A(–).
RDB (Received Data B)	Received data B(+).
RDA (Received Data A)	Received data A(–).

Connection Procedure

Cables Used

There are two types of cable, a 4-wire and 2-wire cable. Choose a cable depending on the following conditions.

Cable Used	Twisted pair shielded cable 3 × 24 AWG or more (4-wire), 2 × 24 AWG or more (2-wire)
Characteristic impedance	100 Ω
Capacitance	50 pF/m
Cable length	Max 1.2 km*

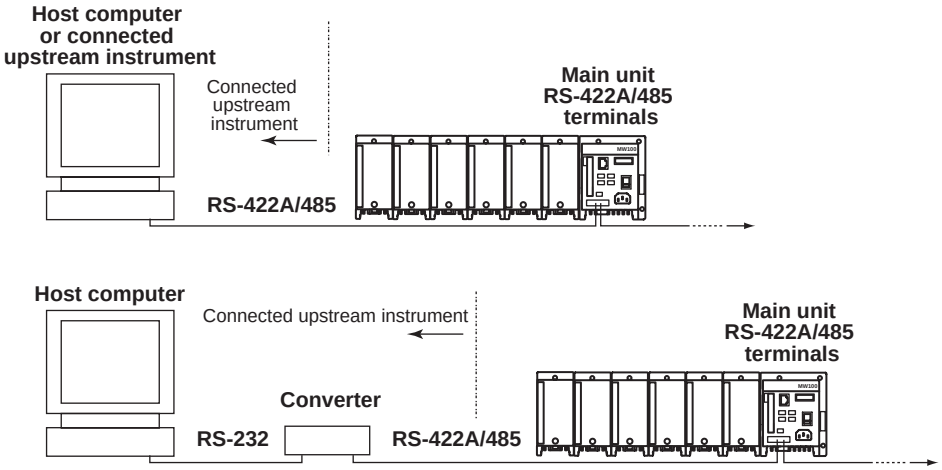
* The transmission distance of the RS-422A/485 interface is not the direct distance, but rather the total cable length (shielded, twisted pair).

WARNING

To prevent electric shock, confirm that the power supply is turned OFF before making connections.

Connections with Upstream Devices

The following figure shows a connection with an upstream device. If the upstream devices use an RS-232 port, connect through a converter.



Example of a Connection with an Upstream Device

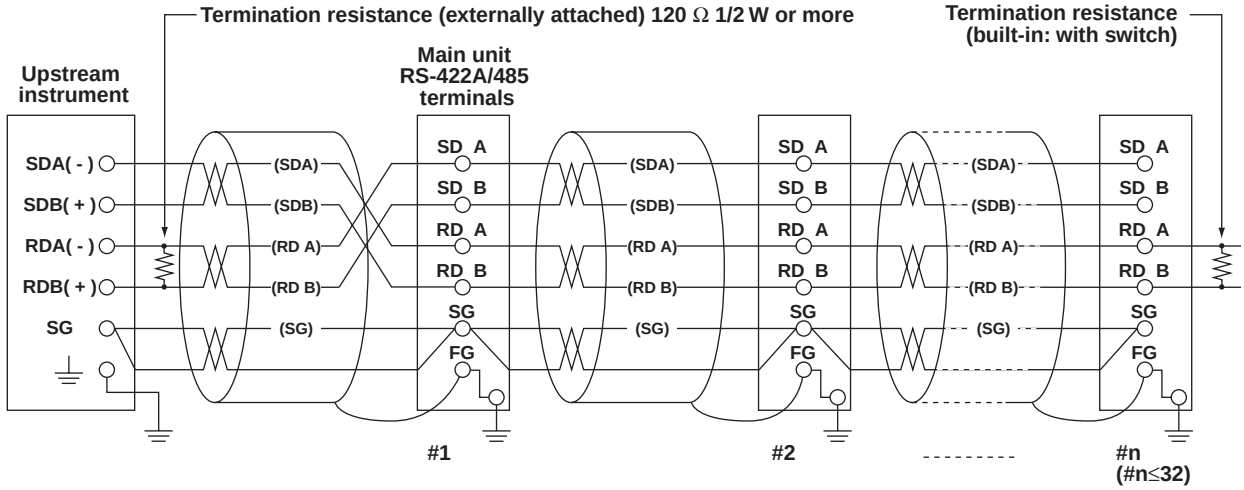
You can connect the MW100 to an upstream device with an RS-232, RS-422A, or RS485 connection port.

For RS-232, use a converter. Refer to the following table for connections to most converter terminals. For details, see the manual that came with the converter.

RS-422A/485 Port	Converter
SDA(–)	TD(–)
SDB(+)	TD(+)
RDA(–)	RD(–)
RDB(+)	RD(+)
SG	SHIELD
FG	EARTH

4-Wire

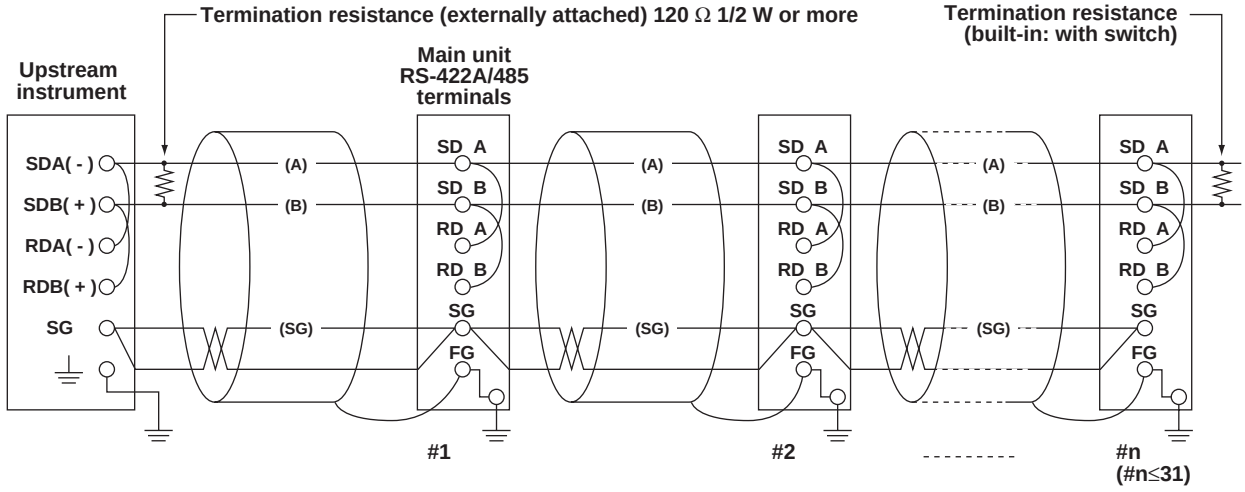
In general, a 4-wire connection is used with upstream devices. For a 4-wire connection, the send and receive wires must be crossed.



Do not connect termination resistance from #1 to #n-1.

2-Wire

On the RS-422A/485 terminal block, connect signals of the same polarity for sending and receiving, and connect only two wires externally.



Do not connect termination resistance from #1 to #n-1.

Note

- The noise rejection method differs depending on the conditions of use. In the connection example, the cable shielding is only connected to the ground of the main unit (one-sided grounding). This method is effective for noise rejection during long distance communications and other processes when there is a difference of potential between the grounding of the computer and that of the main unit. If there is no difference in potential between the PC ground and the main unit ground, it may also be effective to connect to the PC ground as well (two-sided ground). There are also cases where it is effective to use two sided grounding with a capacitor connected in series on one side. Consider the above options when taking measures against noise.
- With the 2-wire configuration (Modbus protocol), after the last data is output from the upstream PC, the 485 driver must be set to high impedance before 3.5 characters.

Serial Interface Converter

The following are recommended models of converters.

RA SYSTEMS CORP./MODEL RC-77, LINE EYE/SI-30FA, YOKOGAWA/ML2

CAUTION

Some converters not recommended here have non-insulated FG and SG terminals. When using such converters, do not connect them as shown on the previous page (do not connect anything to the converter's FG ad SG terminals). Especially for long-distance situations, potential differences can arise causing damage to instruments or communication abnormalities. Also, if the converter has no SG terminal, use the converter as-is without connecting signal ground. For details, see the user's manual for the converter.

Some converters not recommended here have reversed signal polarity (A/B or +/– markings). When using such converters, be sure to reverse the connections.

For 2-wire configurations, to avoid data collision during sending and receiving, the ON/OFF state of the converters send driver must be controlled by the connected upstream device. When using a recommended converter, use RS-232 (RTS) to control ON/OFF of the send driver.

When Using Instruments That Only Support RS-422A

For 4-wire configurations, up to thirty-two MW100s can be connected to a single upstream device. However, if at least one of the devices in the system only supports RS-422A, it may not be possible to connect up to thirty-two units.

When Using Recorders That Only Support Yokogawa RS-422A

The maximum number of units that can be connected in this case is sixteen. Drivers for some conventional Yokogawa recorders (the HR2400, μR series, and other recorders) only support RS-422A. When such recorders are used, only a maximum of sixteen units can be connected.

Note

In the RS-422A standard, up to ten units can be connected to a single port (in 4-wire configurations).

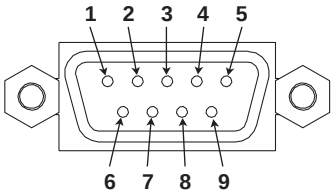
Termination Resistance

This module has built-in termination resistance. When using multi-drop connections (including point-to-point connections), for the outermost unit, turn terminator switch ON. Turn it OFF for units in the middle. Also, turn ON termination resistance for the connected upstream device (see the manual of the upstream device). When using a converter, turn ON its termination resistance. The recommended converters have built-in termination resistance.

2.8 Connecting the RS-232 Interface (/C2 Option)

Connector Pin Assignments and Signal Names

Connector Pin Assignments



Signal Names Corresponding to Connector Pins

The following table shows signal names for the RS-232, JIS, and ITU-T standards.

Pin	Signal Name				Notation	Meaning
	JIS	ITU-T	RS-232			
2	RD	104	BB (RXD)	Receive data	Input signal to the instrument	
3	SD	103	BA (TXD)	Transmitted data	Output signal from the instrument	
5	SG	102	AB (GND)	Signal ground	The signal ground.	
7	RS	105	CA (RTS)	Request to send	The handshaking signal when receiving data from the computer, and output signal from the instrument.	
8	CS	106	CB (CTS)	Clear to send	The handshaking signal when receiving data from the computer, and input signal to the instrument.	

* Pins 1, 4, 6, and 9 are not used.

Handshaking

One of the following four methods in the table below can be selected for the instrument.

Table of Handshaking Methods (○ indicates that it is supported)

Handshaking method	Data Transmission Control (Control used to send data to a PC)			Data Reception Control (Control used to receive data from a PC)		
	Software handshaking	Hardware handshaking	No handshaking	Software handshaking	Hardware handshaking	No handshaking
	Stops transmission when X-OFF is received. Resume when X-ON is received.	Stops transmission when CB (CTS) is false. Resume when it is true.		Send X-OFF when the received data buffer is 3/4th filled. Send X-ON when the received data buffer becomes 1/4th filled.	Set CA (RTS) to False when the received data buffer is 3/4th filled. Set to True when the received data buffer becomes 1/4th filled.	
OFF-OFF			○			○
XON-XON	○			○		
XON-RS	○				○	
CS-RS		○			○	

OFF-OFF

- Send Data Control
  Handshaking is not performed between the instrument and the computer. “X-OFF” and “X-ON” from the computer are treated as data, and CS is ignored.
- Receive Data Control
  Handshaking is not performed between the instrument and the computer. When the receive buffer of the instrument becomes full, data thereafter is discarded.
  RS = True (fixed)

XON-XON

- Send Data Control
  Software handshaking is not performed between the instrument and the computer. If X-OFF is received from the computer while the instrument is sending data, data sending stops, and restarts when the next X-ON code is received. CS from the computer is ignored.
- Receive Data Control
  Software handshaking is not performed between the instrument and the computer. When the used capacity of the instrument's receive buffer reaches 1537 bytes, an X-OFF code is sent to the computer, and when the buffer reaches 511 byte, the X-ON code is sent.
  RS = True (fixed)

XON-RS

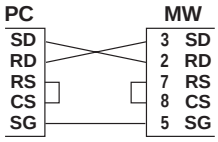
- Send Data Control
  Software handshaking is not performed between the instrument and the computer. If X-OFF is received from the personal computer while the instrument is sending data, data sending stops, and restarts when the next X-ON code is received. CS from the computer is ignored.
- Receive Data Control
  Hardware handshaking is not performed between the instrument and the computer. When the used capacity of the instrument's receive buffer reaches 1537 bytes, RS is set to False, and when the buffer reaches 511 byte, RS is set to True.

CS-RS

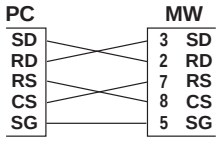
- Send Data Control
  Hardware handshaking is not performed between the instrument and the computer. If CS becomes False while the instrument is sending data, transmission stops and restarts when CS becomes True. X-OFF and X-ON from the computer are treated as data.
- Receive Data Control
  Hardware handshaking is not performed between the instrument and the computer. When the used capacity of the instrument's receive buffer reaches 1537 bytes, RS is set to False, and when the buffer reaches 511 byte, RS is set to True.

Connection Examples

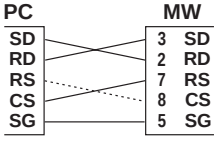
• OFF-OFF/XON-XON



• CS-RS(CTS-RTS)



• XON-RS(XON-RTS)



The RS on the PC side and the CS on the instrument side do not need to be connected for control. However, we recommend that they be connected so that the cable can be connected in either direction.

Note

- A computer program must be created such that the receive buffers of the instrument and computer do not become FULL.
- When selecting XON-XON, output data in ASCII format.

2.9 Serial Interface Settings

Selecting the Baud Rate

Select a baud rate from the list below.

1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200

Setting the Data Length

Select a data length from the list below. When outputting data in binary format, you must use 8 bits.

7, 8

Selecting the Parity Check

Select a parity check from the list below.

ODD, EVEN, NONE

Selecting the Stop Bit

Select a bit length from the list below.

1, 2

Selecting the Handshaking Method

Select a handshaking method from the list below. This setting is only valid when using the RS-232 interface.

OFF:OFF, XON:XON, XON:RS, CS:RS

Selecting an Address

Select an address from the list below. This is valid for the RS-422A/485 interface and Modbus protocol.

1 to 32 (for dedicated protocol)

1 to 247 (for Modbus protocol)

Selecting the Standard Protocol

Select NORMAL when performing communications using the “Standard” RS-232 or RS-422A/485 protocol.

2.10 Measures Against Noise on the MW100 Data Acquisition Unit

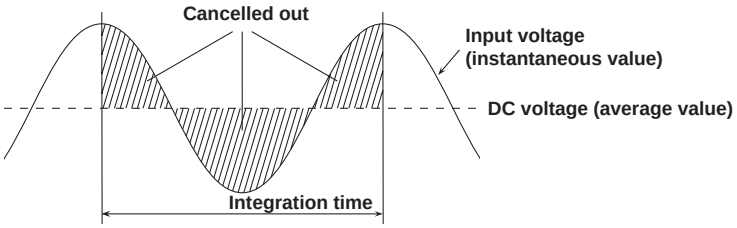
The technical Information described below is available as reference material on measures against noise. For information on obtaining a copy, contact your nearest YOKOGAWA dealer.

- Noise Interference on Recorder (TI 4D5B1-80E)
  Describes the fundamentals concerning noise and its countermeasures in two parts: basic edition and application edition.
- MX100 Performance Specifications (TI 04M08B01-00E)
  This describes in detail the noise rejection characteristics and functions that are unique to the MW100 Data Acquisition Unit.

This section briefly describes the integrating A/D converter and the first-order lag filter that the MW100 Data Acquisition Unit employs as measures against noise.

Integrating A/D Converter

MW100 input modules employ integrating A/D converters for converting the measured analog signals into digital signals. The integrating A/D converter integrates the measured values at the specified time width. If the specified time spacing matches the period of the signal you wish to reject, the signal is rejected.



For example, if the integration time is 20 ms, signals having frequencies of 50 Hz and integer multiples of 50 Hz can be rejected. Likewise, if the integration time is 16.67 ms, signals having frequencies of 60 Hz and integer multiples of 60 Hz can be rejected. If the integration time is 100 ms, signals having 10 Hz and integer multiples of 10 Hz can be rejected. The commercial power supply is one of the noise sources. By setting these integration times, commercial power noise of 50 Hz or 60 Hz can be eliminated.
On the MW100, the integration time is set as shown below.

4-CH, High-Speed Universal Input Module

Measurement Interval	Integration Time	Rejected Frequencies and Notes
10 ms	1.67 ms	600 Hz and its integer multiples
50 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Automatically detects the power supply frequency and set 16.67 or 20 ms
100 ms	36.67 ms	50 Hz and 60 Hz and their integer multiples
200 ms		
500 ms	100 ms	10 Hz and its integer multiples
1 s	200 ms	Low-pass filter with Fc = 5 Hz
2, 5,10, 20, 30, 60 s		

6-CH, Medium-Speed 4-wire RTD Resistance Input Module/10-CH, Middle-Speed Universal Input Module

Measurement Interval	Integration Time	Rejected Frequencies and Notes
100 ms	1.67 ms	600 Hz and its integer multiples*
200 ms		
500 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Automatically detects the power supply frequency and set 16.6 or 20 ms
1 s	36.67 ms	50 Hz and 60 Hz and their integer multiples
2 s	100 ms	10 Hz and its integer multiples
5, 10, 20, 30, 60 s	200 ms	Low-pass filter with Fc = 5 Hz

* Because the power supply frequency noise is not rejected, measured values may fluctuate particularly for temperature measurements using thermocouples. If this happens, make the measurement interval longer, or use the 4-CH High-Speed Universal Input Module.

4-CH, Medium-Speed Strain Input Module

Measurement Interval	Integration Time	Rejected Frequencies and Notes
100 ms	1.67 ms	600 Hz and its integer multiples*
200ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Automatically detects the power supply frequency and set 16.67 or 20 ms
500 ms	36.67 ms	50 Hz and 60 Hz and their integer multiples
1 s	100 ms	10 Hz and its integer multiples
2 s	200 ms	Low-pass filter with Fc = 5 Hz
5, 10, 20, 30,60 s		

* When the measurement interval is 100 ms, measured values may fluctuate since power supply frequency noise is not rejected.
In such cases, set the measurement interval to 200 ms or more.

However, when using the SNTP time synchronization function, the integral times below are used.

6-CH, Medium-Speed 4-wire RTD Resistance Input Module/
10-CH, Middle-Speed Universal Input Module

Measurement Interval	Integration Time	Rejected Frequencies and Notes
100 ms	1.67 ms	600 Hz and its integer multiples*
200 ms		
500 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Automatically detects the power supply frequency and set 16.6 or 20 ms
1 s	36.67 ms	50 Hz and 60 Hz and their integer multiples
2 s		
5 s	100 ms	10 Hz and its integer multiples
10, 20, 30, 60 s	200 ms	Low-pass filter with Fc = 5 Hz

* Because the power supply frequency noise is not rejected, measured values may fluctuate particularly for temperature measurements using thermocouples. If this happens, make the measurement interval longer, or use the 4-CH High-Speed Universal Input Module.

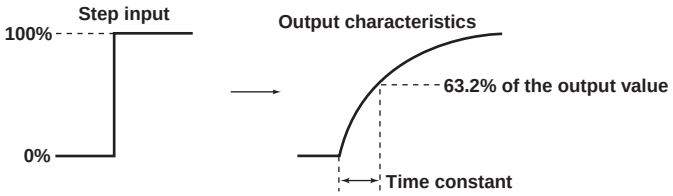
4-CH, Medium-Speed Strain Input Module

Measurement Interval	Integration Time	Rejected Frequencies and Notes
100 ms	1.67 ms	600 Hz and its integer multiples*
200 ms	16.67 ms	60 Hz and its integer multiples
	20 ms	50 Hz and its integer multiples
	Auto	Automatically detects the power supply frequency and set 16.6 or 20 ms
500 ms	36.67 ms	50 Hz and 60 Hz and their integer multiples
1 s	100 ms	10 Hz and its integer multiples
2 s		
5, 10, 20, 30, 60 s	200 ms	Low-pass filter with Fc = 5 Hz

* When the measurement interval is 100 ms, measured values may fluctuate since power supply frequency noise is not rejected.
In such cases, set the measurement interval to 200 ms or more.

First-Order Lag Filter

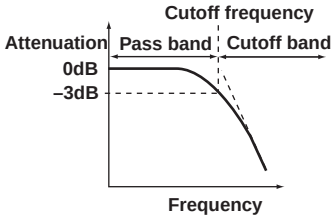
For noise sources other than power supply noise, the MW100 Data Acquisition Unit is equipped with a first-order lag filter having output characteristics indicated in the figure below against step input.
For the filter setting, the time constant is determined by selecting filter coefficient N for the measurement interval.



Filter coefficient = measurement interval x filter coefficient N

Measurement Interval (s)	Selectable Time Constants (s)						
	N=5	N=10	N=20	N=25	N=40	N=50	N=100
0.01	0.05	0.1	0.2	0.25	0.4	0.5	1
0.05	0.25	0.5	1	1.25	2	2.5	5
0.1	0.5	1	2	2.5	4	5	10
0.2	1	2	4	5	8	10	20
0.5	2.5	5	10	12.5	20	25	50
1	5	10	20	25	40	50	100
2	10	20	40	50	80	100	200
5	25	50	100	125	200	250	500
10	50	100	200	250	400	500	1000
20	100	200	400	500	800	1000	2000
30	150	300	600	750	1200	1500	3000
60	300	600	1200	1500	2400	3000	6000

If the first-order lag filter is applied to the input signal, low-pass filter frequency characteristics shown in the figure below are attained.



If the time constant of the first-order lag filter is set long, the cutoff frequency is lowered, and frequency bandwidth that can be rejected is widened. Set an appropriate time constant according to the frequency of the noise you wish to reject.

2.11 Handling of the CF Card

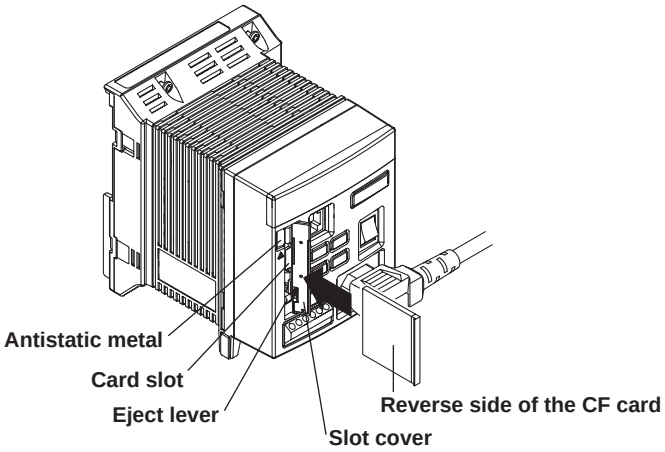
Handling Precautions of the CF Card

Note the following points when using the CF card. For the general handling precautions of the CF card, see the instruction manual that came with the CF card.

- The CF card is a precision electronic device. Do not use or store the CF card in an environment with strong static electricity or an environment where electric noise tends to appear.
- Do not remove the CF card from the card slot while data is being written. Doing so can damage or erase the data.

Inserting the CF Card

When inserting the CF card into the card slot, first touch the antistatic metal, then open the slot cover, and finally insert the card with the back side facing left as in the figure below.



Ejecting the CF Card

Be sure to check that the CF card is not being accessed before ejecting the card from the slot.

To eject the CF card, first open the slot cover while touching the antistatic metal, then push the eject lever. Then, press the eject lever that came out once again, and remove the CF card from the slot.

Note

- If the eject lever is difficult to push with your finger, use the tip of a pen or other pointed object.
- Do not close the slot cover by force when the eject lever is out. Doing so can damage the CF card slot. When not using the eject lever, push the lever in so that the slot cover can be closed.

3.1 Connection Environment

This section explains the environment in which the MW100 is connected, including requirements for the PC system, browser and plug-in software, and setting screens. This chapter focuses on settings entered with the browser. For information about communication commands, see the Communication Command manual (IM MW100-17E).

PC System Requirements

- **PC Hardware**
  Intel Pentium II, 400-MHz CPU or higher (Pentium III, 1-GHz or higher recommended) and at least 256 MB of memory (512 MB or more recommended).
- **OS (Operating System)**
  Windows 2000 or Windows XP (recommended) required.
- **Display**
  XGA (1024 × 768 resolution) or better and capable of displaying 65535 or more colors.
- **Ethernet Port**
  An Ethernet port compatible with the OS (requires 10BASE-T or 100BASE-TX).

Browser

The following browser is required for entry of settings on the MW100.

- Internet Explorer 5.0 or later (recommended)

Installing Java

Java is required for entering settings using a browser.

- JRE (Java runtime environment) version 1.4 or later. (Version 1.4 recommended)

Java might not be installed on the following operating systems.

- Windows 2000 SP4 or later
- Windows XP SP2 or later

If not installed, you can install it from the MW100 User's Manual CD.

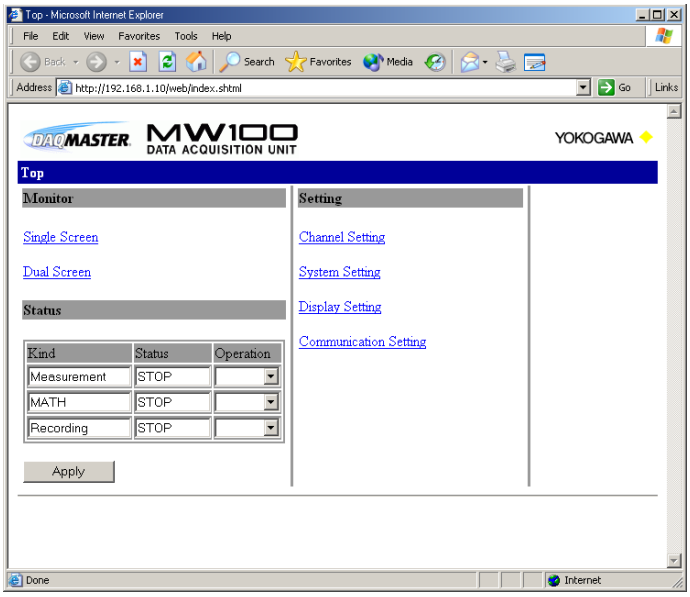
MW100 Operation Screens

The operation screens of the MW100 main module consist of **Monitor** screens enabling operations in Measurement mode, **Setting** screens that are mainly used in Setting mode, and **Status** screens for mode changes.

Top Screen

- **Monitor**
  Single Screen, Dual Screen
- **Setting**
  Channel Setting, System Setting, Display Setting, Communication Setting
- **Status**
  Measurement, Recording, and MATH status changes

When entering settings, the pages for all setting items are displayed, but there may be settings or items that cannot be entered depending on the installed modules and options.

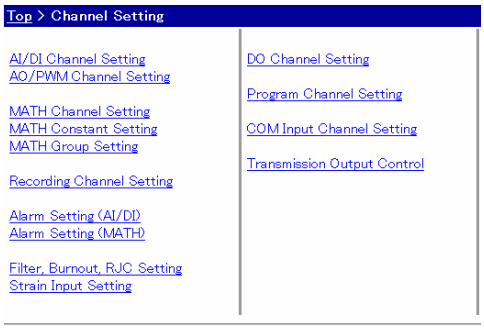


Single Screen and Dual Screens

Monitor-displays the data from the MW100.
For details on the operation, see section 3.16, “Measured Data Monitor Display/ Settings.”

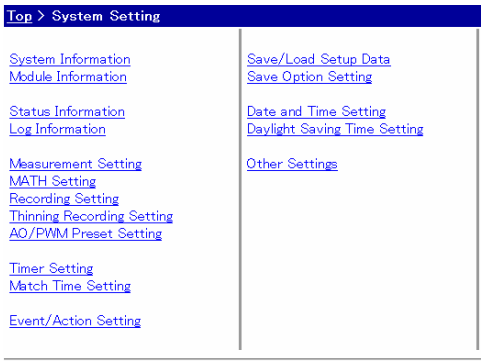
Channel Setting

You can set the measuring range, expressions, and other items.



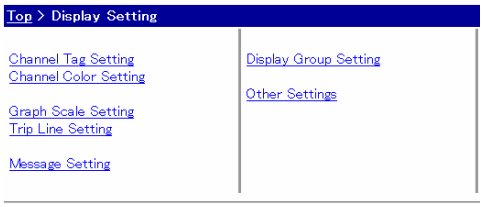
System Setting

You can set the measurement interval, measurement groups, and other items.



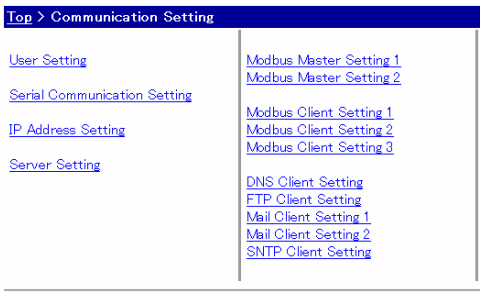
Display Setting

You can set tags, display groups, and other items.



Communication Setting

You can perform user registration and enter FTP/e-mail settings, and other items.



Switching Modes

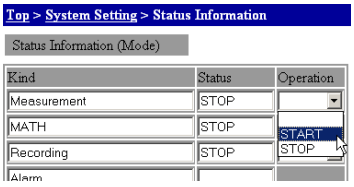
The MW100 has a Measurement mode and a Setting mode, and the mode must be changed depending on the operation to be performed. For operating procedures, see section 3.3, “System Settings.”

Meas. Mode

To Single Screen or Dual Screens for the monitor, switch to Measurement mode. The items to set after switching to Measurement mode are shown in the figure below.

Setting Mode

To modify channel settings, system settings, display settings, or communication settings, switch to Setting mode. The items to set after switching to Setting mode are shown in the figure below.



3.2 Connection to the MW100

Connection to the MW100 can be made using Ethernet or serial communications (optional). Also, when performing communication using the Modbus protocol, Modbus settings are required. When the login function is enabled, connection is made after entering a user name and password.

Setting Mode

Ethernet Connection

Setting Up Ethernet for the First Time, IP Address Unclear

Ethernet connections are not possible under the factory default settings. You must enter an IP address.

1. After opening an Ethernet connection between the MW100 and PC, run the MW100 Viewer software CD-ROM or the IP address setting software installed on the PC.
2. You can select to enter a fixed IP address, or have the address automatically obtained by DHCP. If you select a fixed IP address, enter the IP address, subnet mask, default gateway, and DNS.
3. Skip to the procedures under Connecting to an MW100 with a Specified IP Address (Including DHCP).

For the setting procedure, see the MW100 Viewer Software User's Manual (IM MW180-01E). You can also start up and connect using a fixed IP address.

When Connecting to an MW100 with a Specified IP Address (Including DHCP).

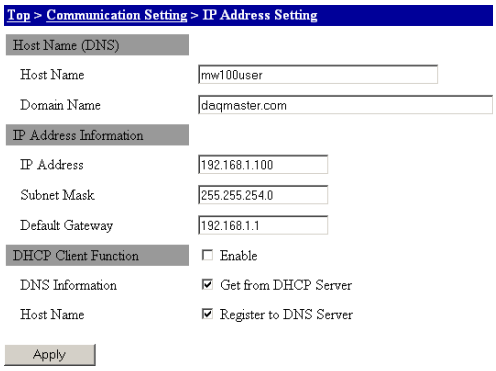
1. Open an Ethernet connection between the MW100 and PC, then start the browser.
2. Enter the host name or IP address of the MW100 in the browser's URL/Address box. The MW100 top page appears. If the login function is set, step 3 is required.
   Ex. 1) IP address is 192.168.1.100
   http://192.168.1.100/
   Ex. 2) Host name is mw100user
   http://mw100user/
3. Before the top page appears, the **network password entry** screen is displayed. Enter a user name and password and click the OK button.

Changing the IP Address and Connecting

This is used when an IP address has already been set, and the IP address will be changed by browser or DHCP before connecting. To change the IP address, follow steps 1-6 and 10-11. For changes by DHCP, follow steps 1-3 and 7-11.

1. From the **Top** screen, click **Communication Setting** > **IP Address Setting**.
2. Enter a host name in the **Host Name** box under DNS Information.
3. Enter a domain name in the **Domain Name** box under DNS Information.
4. Enter a fixed IP address in the **IP Address** box under IP Address Information.
5. Enter a subnet address in the **Subnet Mask** box under IP Address Information.
6. Enter a default gateway address in the **Default Gateway** box under IP Address Information.
7. To enable the DHCP client function, select the **DHCP Client Function** check box.

8. To obtain DNS information from the server, select the **DNS Information** check box.
9. To register a host name on the server, select the **Host Name** check box.
10. Click the **Apply** button.
11. Power cycle the MW100. **The setting changes are applied.**



Connecting with Serial Communication (Optional)

You can enter settings using a browser, or with communication commands. The following explains setting entry using a browser. For information about communication commands, see the Communication Command manual (IM MW100-17E).
From the top page, click **Communication Setting** > **Serial Communication Setting**.

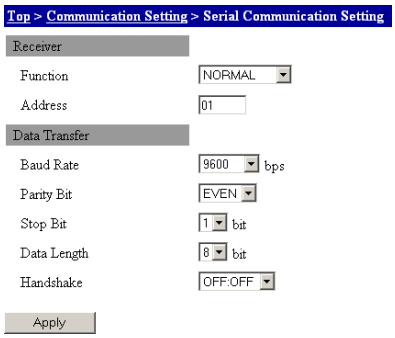
Receiver Settings

1. In the **Function** list, select **NORMAL** (general communications), **MODBUS_M** (Modbus master), or **MODBUS_S** (Modbus slave). Modbus settings consist of master and slave settings.
2. Enter an address number in the **Address** box.

Data Transfer Settings

1. Select a baud rate in the **Baud Rate** list.
2. Select a parity check method in the **Parity Bit** list.
3. Select a number of bits from the **Stop Bit** list.
4. Select a communication data length from the **Data Length** list.
5. Select a handshaking method in the **Handshake** list.

Click the **Apply** button.

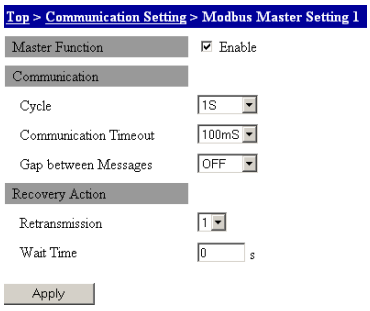


Modbus Settings

Set when using the Modbus function. For Modbus/TCP, set “Modbus client settings 1, 2, and 3.” For Modbus/RTU, set “Modbus master settings 1 and 2,” and “Receiver settings.”

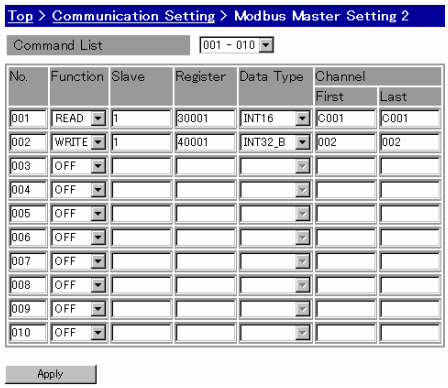
Modbus Master Setting 1

1. From the **Top** screen, click **Communication Setting** > **Modbus Master Setting 1**.
2. Select the **Enable** check box under **Master Function**.
3. Select a communication interval from the **Cycle** list under Communication.
4. Select a timeout time from the **Communication Timeout** list under Communication.
5. In the **Gap between Messages** list under Communication, select a gap time from receiving of the response until the sending of the next command.
6. Select a number of times in the **Retransmission** list under Recovery Action.
7. Enter a recovery wait time in the **Wait Time** box under Recover Action.
8. Click the **Apply** button.



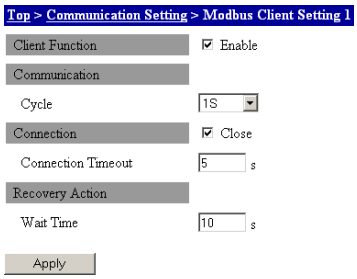
Modbus Master Setting 2

1. From the **Top** screen, click **Communication Setting** > **Modbus Master Setting 2**.
2. Select the command number group to be set from the **Command List** list.
3. Select READ/WRITE in the **Function** box.
4. Enter the address of the slave device in the **Slave** box.
5. Enter the numbers of the used registers in the **Register** box. When specifying multiple registers, enter the first register number.
6. Select a data type in the **Data Type** list.
7. Enter the channel numbers used in the **Channel** boxes.
8. Click the **Apply** button.



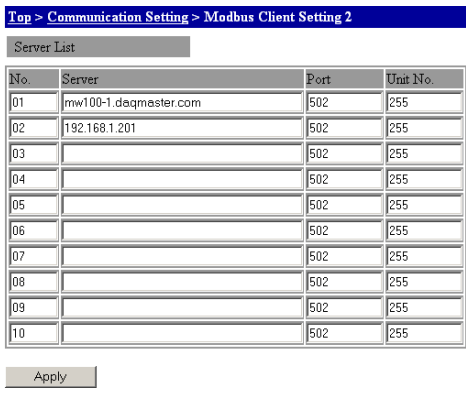
Modbus Client Setting 1

1. From the **Top** screen, click **Communication Setting** > **Modbus Client Setting 1**.
2. Select the **Enable** check box under **Client Function**. After clicking the **Apply** button, the settings are enabled and communication begins.
   Clear the **Enable** check box and click the **Apply** button to stop communications.
3. Select a communication interval from the **Cycle** list under **Communication**.
4. If you select the **Close** check box and there is no response from the server, communication is closed after the time entered in **Connection Timeout** elapses.
5. Enter the time until communication is closed in the **Connection Timeout** to box under **Connection**.
6. Enter the time until communications are recovered in the **Wait Time** box under **Recovery Action**.
7. Click the **Apply** button.



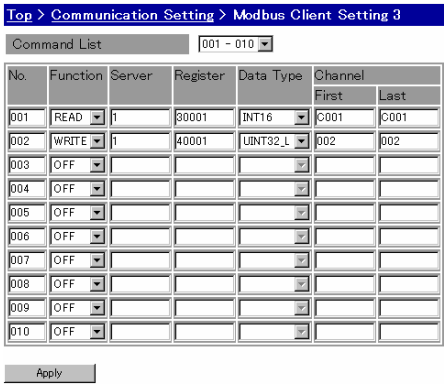
Modbus Client Setting 2

1. From the **Top** screen, click **Communication Setting** > **Modbus Client Setting 2**. The server list is displayed.
2. Enter the server name in the **Server** box.
3. Enter the server port number in the **Port** box.
4. Enter the server unit number in the **Unit No.** box.
5. Click the **Apply** button.



Modbus Client Setting 3

1. From the **Top** screen, click **Communication Setting** > **Modbus Client Setting 3**.
2. Enter settings in the same manner as for **Modbus Master Setting 2**. Enter the server number of the server list in the **Server** box.



Login Function and User Settings

Using this function, you can restrict access to previously registered users.
From the **Top** screen, click **Communication Setting** > **User Setting**.

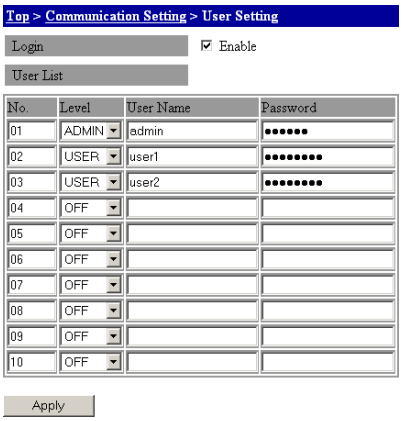
Login Function

Select the **Enable** check box. This enables the **login function**.

User Settings

1. Select ADMIN or USER in the **Level** list under User List. Only ADMIN can be selected for list number 01.
2. Enter the user name to set in the **User Name** box under User List.
3. Enter the password to assign to the user in the **Password** box under User List.

Click the **Apply** button.



3.3 System Settings

Setting Mode

System Reconstruction

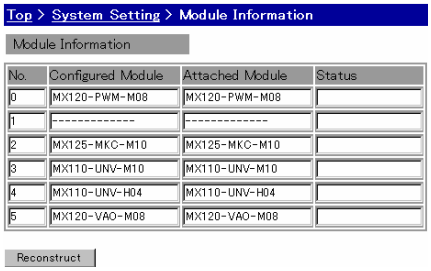
When connecting the MW100 for the first time, or when changing the position of an installed input/output module on the connected MW100, system reconfiguration is performed (to match up with the actual modules). Before reconfiguration, connect to the MW100 to be reconfigured.

Note

Always turn the power to the MW100 OFF before attaching or removing input/output modules.

Setting Module Information

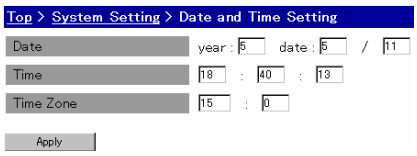
1. From the top page, click **System Setting** > **Module Information**.
2. If the **Configured Module** and **Attached Module** boxes are different, click the **Reconstruct** button to reconfigure the system.



Setting the Date and Time

Sets the date and time on the MW100.

1. From the top page, click **System Setting** > **Date and Time**.
2. Enter the year, month, and date in the **Date** box. Use the last two digits of the Western calendar for the year.
3. Enter the hour, minute, and second in the **Time** box. Time is specified in 24-hour format.
4. Enter the hour and minutes in the **Time Zone** box.
5. Click the **Apply** button.



Formatting the CF Card, Checking the Free Space and System Information , and Initialization

You can format the CF card and check the amount of available space on the card. Also, you can check system information and initialize settings in the same screen.
From the top screen, click **System Setting** > **System Information**.

Checking the Free Disk Space

The amount of used and total space is displayed in the **Capacity** box under Media Information.

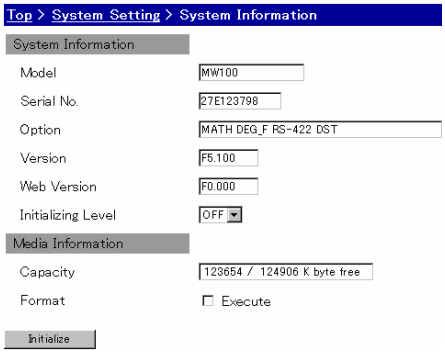
Formatting

1. Select the **Format** check box under Media Information.
2. Click the **Initialize** button to initialize the CF card.

Checking System Information and Initializing

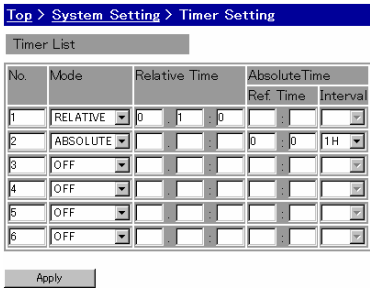
You can view the model name, serial number, installed options, firmware version, and WEB software version in the corresponding display boxes.
Also, you can initialize system settings. For details, see section 4.6, “Initializing the System.”

1. Select the initialization level from the **Initialization Level** list.
2. Click the **Initialize** button to initialize the system settings.



Daylight saving Time Setting

1. From the top screen, click **System Setting** > **Daylight Saving Time Setting**.
2. Select the **Daylight Saving Time** check box. The Summer time and Winter time function is enabled.
3. Select a starting month, week, and day of the week for the start of Summer time in the **Start Time** box. Enter a start time in the box.
4. Select an ending month, week, and day of the week for the end of Summer time in the **End Time** box. Enter an end time in the box.
5. Click the **Apply** button. The Summer time and Winter time start times are enabled.



Other Settings

You can set the MW100 unit number, units of temperature, key lock for preventing inadvertent operations, alarm hold, and rate of change interval.
From the top screen, click **System Setting** > **Other Settings**.

Unit Number
Enter a number from 0 to 89 for identifying the unit in the **Unit No.** box.

Temperature Unit
Select Celsius DEG_C or Fahrenheit DEG_F in the **Temperature Unit** list.

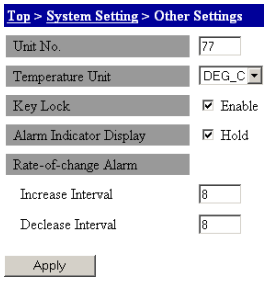
Main Unit Key Lock
If the **Key Lock** check box is selected, the key lock becomes active.

Alarm Status Hold
If the **Hold** check box is selected, alarms are held.

Rate of Change Interval

1. Enter the measurement count that determines the interval in the **Increase Interval** box under **Rate-of-Change Alarm**.
2. Enter the measurement count that determines the interval in the **Decrease Interval** box under **Rate-of-Change Alarm**.

Click the Apply button. The settings for each item are enabled.



Status Information and Processing

You can change the MW100 operation mode, operate the main unit keys, and check alarm statuses.

Changing Status Information (Mode)
From the top screen, click **System Setting** > **Status Information**. You can perform the same procedure in the **Status** table in the top screen.

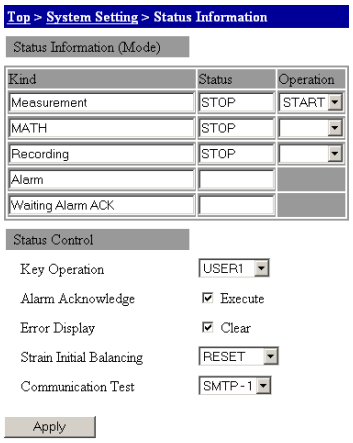
- Switching between Measurement Mode and Setting Mode
  1 In the **Operation** box under Measurement, you can select **START** to switch to Measurement mode, or **STOP** to switch to Setting mode.
  2. Click the **Apply** button. The changed status is displayed in the **Status** display box.
- Computation Start/Stop
  1 In the **Operation** box under the MATH item, you can select **START** to start computation, or **STOP** to stop computation.
  2. Click the **Apply** button. The changed status is displayed in the **Status** display box. You can also start and stop computation from the Monitor screen.
- Recording Start/Stop
  1 In the **Operation** box under the Recording item, you can select **START** to start recording, or **STOP** to stop recording.
  2. Click the **Apply** button. The changed status is displayed in the **Status** display box. You can also start and stop recording from the Monitor screen.

Checking Status Information

When an alarm occurs, Waiting Alarm ACK is displayed in each display box.

Processing and Operation

- Operating Main Unit Keys
  1. Select the main unit key you wish to operate from the **Key Operation** list.
  2. Click the **Apply** button. The same operation takes place as if you had pressed the main unit key.
- Checking the Alarm Status
  1. Select the **Alarm Acknowledge** check box.
  2. Click the **Apply** button. Held alarms are cleared.
- Clearing the Error Display
  1. Select the **Error Display** check box.
  2. Click the **Apply** button. Clears the error number displayed in the 7-segment LED.
- Executing Strain Initial Balancing
  1. Select the initial balance execution method from the **Strain Initial Balancing** list.
  2. Click the **Apply** button. Initial balancing is executed on the channel selected in the strain input settings in the channel settings.
- Execute Communication Test
  1. Select the item you wish to test from the **Communication Test** list.
  2. Click the **Apply** button. The test is executed.



3.4 Setting Acquisition Conditions for Measured/ Computed Data

This is an explanation of measurement settings, MATH settings, recording settings, and thinning settings.

Setting Mode

Measurement Operation Settings

From the top screen, click **System Setting** > **Measurement Setting**.

Measurement Group Settings

Select the measurement interval from the **Interval** list. Set a measurement interval for each group number.

Measurement Module Settings

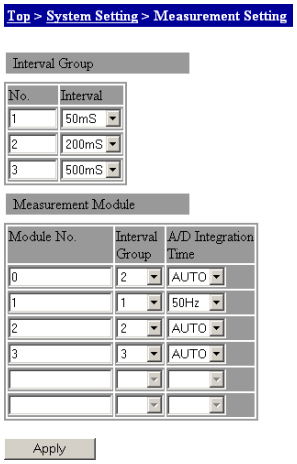
Sets the integral time and measurement group assignments for each module. See each modulels specifications for the measurement interval and integral times that can be set on them.

1. Select the group you wish to assign in the **Interval Group** list.
2. Select an integral time of AUTO, 50 Hz, or 60 Hz in the **A/D Integration Time** list. This setting is enabled from the measurement interval.

Click the **Apply** button. This enables the settings changes.

Note

The measurement interval that is assigned to the measurement group number is,
(interval is short) < meas. group1 ≤ meas. group2 ≤ meas. group 3 < (interval is long)



Computation Operation Settings

From the top screen, click **System Setting** > **MATH Setting**.

MATH Interval Settings

Select the measurement group number in the **Interval Group** list. This becomes the interval that is assigned to the selected group number. Set a value that is the same as the measurement interval of at least one of the installed input modules.

MATH Settings

In step 1, set the operation upon computation error, and in steps 2 and 3, set the measurement input other than for TLOG/CLOG computation.

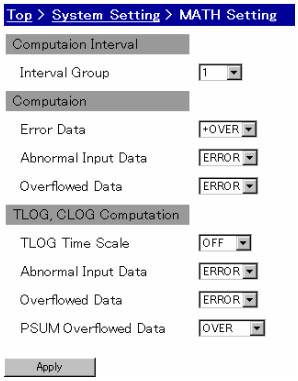
1. Select +OVER or –OVER in the **Computation Error Data** list.
2. Select ERROR (computation error) or SKIP in the **Abnormal Input Data** list.
3. Select ERROR (Overflow value), SKIP, or LIMIT in the **Overflowed Data** list.

TLOG and CLOG Computation

Sets the operation for TLOG and CLOG computation.

1. Select the units of integration in the **TLOG Time Scale** list.
2. Select ERROR (computation error) or SKIP in the **Abnormal Input Data** list.
3. Select ERROR (computation error), SKIP, or LIMIT in the **Overflowed Data** list.
4. Select OVER (computation stop) or ROTATE in the **PSUM Overflowed Data** list.

Click the **Apply** button. This enables the settings changes.



Recording Operation Settings

From the top screen, click **System Setting** > **Recording Setting**.

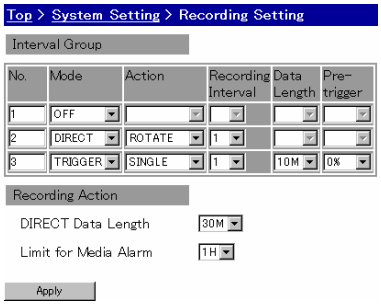
Set the recording operation for each measurement group.

1. Select the recording start timing in the **Mode** list under Interval Group.
   If you select DIRECT, steps 2 and 3 are required, and if you select TRIGGER, steps 2 to 5 are required.
2. Select the recording operation in the **Action** list under Interval Group.
3. Select the recording interval in the **Recording Interval** list under Interval Group.
4. Select a recording data length from the **Data Length** list under Interval Group.
5. Select a pretrigger length (%) from the **Pre-trigger** list under Interval Group.

Recording Operation Settings

1. Select a recording data length from the **DIRECT Data Length** list.
   Measurement groups for which the recording start timing is DIRECT are all set to this.
2. Select the remaining space time in the **Limit for Media Alarm** list. When the specified remaining amount is reached, you can have output such as relay output occur.

Click the **Apply** button. This enables the settings changes.



Thinning Operation Settings

From the top screen, click **System Setting** > **Thinning Recording Setting**.

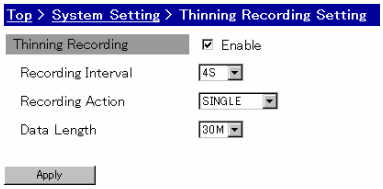
Thinning Settings

Select the **Enable** check box. Thinning recording is enabled, and you can enter thinning recording settings.

Setting the Thinning Interval, Recording Operation, and Recording Data Length

1. Select the thinning time in the **Recording Interval** list. A time shorter than the measurement interval specified for the measurement group cannot be set.
2. Select a recording operation in the **Recording Action** list.
3. Select a recording data length from the **Data Length** list.

Click the **Apply** button. This enables the settings changes.



Recording Channel Settings

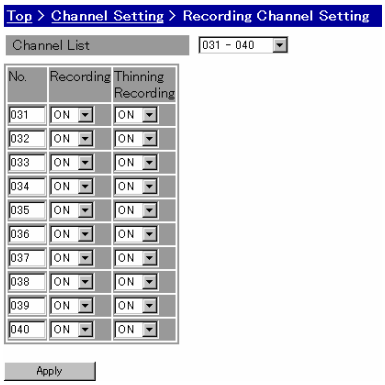
You can set the channels to which data is recorded or thinned.

1. From the top screen, click **Channel Setting** > **Recording Channel Setting**.
2. Select the channel group you wish to set from the **Channel List** list.

Recording and Thinning Settings

1. Turn ON recording in the **Recording** list when recording data.
2. Turn ON data thinning in the **Thinning Recording** list when thinning data.

Click the **Apply** button. This enables the settings changes.



3.5 Setting Measurement Conditions (Measurement Channel Settings)

Setting Mode

Measurement Channel Settings

You can set the input type, range, span, computations, scale and differential input.
The selectable input type, range, and other settings can differ depending on the module.
For details, see the explanation of the functions of individual modules in chapter 1, “Explanation of Functions,” or chapter 5, “Specifications.”
For information on the scale value of the measuring range, see section 3.12, “Scale Value Settings.”

Setting the Input Range

1. From the top screen, click **Channel Setting** > **AI/DI Channel Setting**.
2. Select the channel group you wish to set from the **Channel List** list.

Setting the Input Mode

Select the input type from the **Mode** list.

Setting the Measuring Range

Select the measurement range from the **Range** list.

Setting the Measurement Span

Determines the actual measuring range from the measurable range.
Enter the lower and upper limit of Span in the **Lower** or **Upper** boxes under **Span**.

Setting the Scale

Set this item when linearly scaling the measured values.

1. Select **SCALE** in the **Calc** list.
2. Enter the lower or upper limit of scale in the **Lower** or **Upper** box under **Scale**.
3. Select the decimal place from the **D.P.** list under **Scale**.
4. Enter the scale conversion value in the **Unit** box.

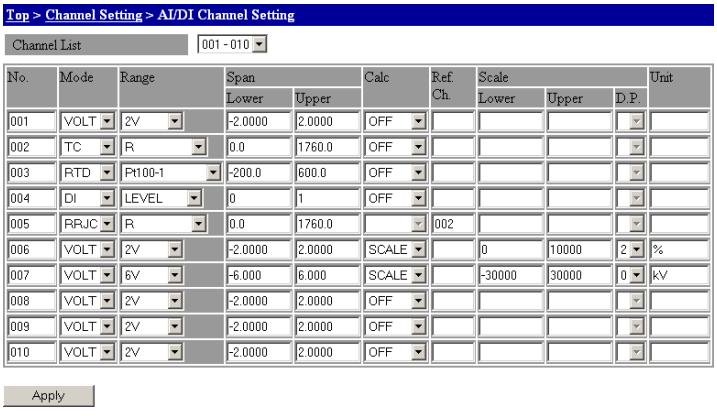
Differential Input Settings

1. Select **DELTA** in the **Computation** box.
2. Enter the reference channel number in the **Reference** box.

Remote RJC (RRJC) Reference Channel Setting

Enter the remote RJC reference channel number in the **Ref. Ch.** box. This is required when RRJC is selected for the input type.

Click the **Apply** button. This enables the settings changes.



Filter and Thermocouple Settings

You can set filters for measurement channels. Also, when the input type is set to thermocouple (TC), you can set the burnout/RJC behavior. This setting is allowed even if the input type of the measurement channel is something other than thermocouple (TC), but has no effect in that case.

From the top screen, click **Channel Setting** > **Filter, Burnout, RJC Setting**.

Setting the Filter Coefficient

Select a coefficient in the **Filter** list. For information about filter coefficients, see section 2.10, “Measures against Noise on the MW100 Data Acquisition Unit.”

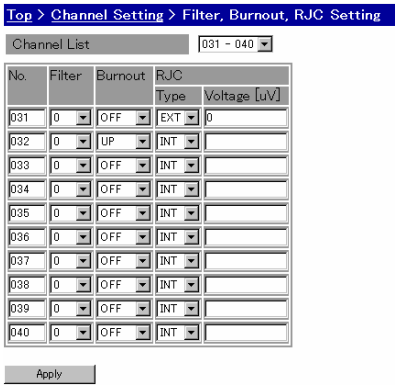
Setting the Burnout

Select the direction in which the measured value is set off the range when a burnout detection occurs from the **Burnout** list.

Reference Junction Compensation

1. Select the type of reference junction compensation in the **Type** box under **RJC**.
2. Enter a reference junction compensation voltage in the **Voltage[uV]** box. Set when reference junction compensation is set to external (EXT).

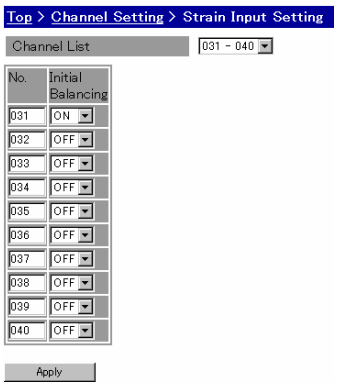
Click the **Apply** button. This enables the settings changes.



Setting Up and Executing Strain Input Initial Balancing

If the measurement channel is strain input, you can enter settings for executing initial balancing. This setting is allowed even if the measurement channel is something other than strain input, but has no effect in that case.

1. From the top screen, click **Channel Settings** > **Strain Input Setting**.
2. Select the channel group you wish to set from the **Channel List** list.
3. Turn **ON** the channel on which you wish to perform initial balancing in the **Initial Balancing** list.
4. Click the **Apply** button to finalize.



5. Execute the **Initial balance** items in the Status information of the system settings. For details, see section 3.3, “System Settings.”

3.6 MATH Settings (MATH Channel Settings and the /M1 Option)

You can set the MATH operation, expressions, scales, MATH coefficients, and MATH groups. This section also explains settings for program channels and communication input data.
For information on entering the MATH span in expressions, see section 3.12, “Scale Input Methods.”

Setting Mode

Entering Expressions

1. From the top screen, click **Channel Setting** > **MATH Channel Setting**.
2. Select the channel group you wish to set from the **Channel List** list.

Setting the MATH Operation

Turn ON the MATH channels to be used in the **Action** list.

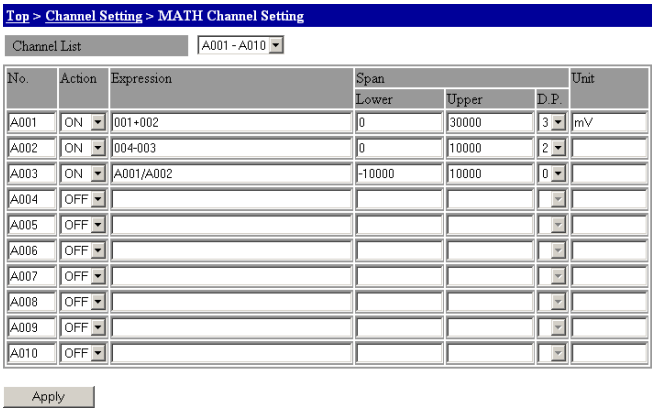
Entering Expressions

Enter an expression in the **Formula** box. For information about expressions, see section 1.13, “MATH Functions (/M1 Option).”

Setting the MATH Span

1. Enter the lower or upper limit of the MATH span in the **Lower** or **Upper** box under **Span**.
2. Select the decimal place from the **D.P.** list under **Span**.
3. Enter the scale conversion value in the **Unit** box.

Click the **Apply** button. This enables the settings changes.



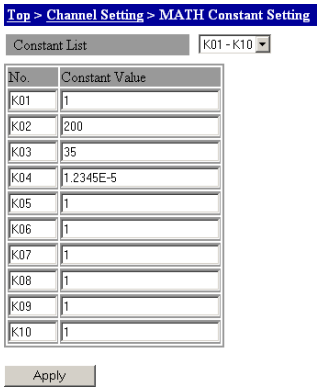
Setting MATH Constants

1. From the top screen, click **Channel Setting** > **MATH Constant Setting**.
2. Select the constant group you wish to set from the **Constant List** list.

Entering Math Constants

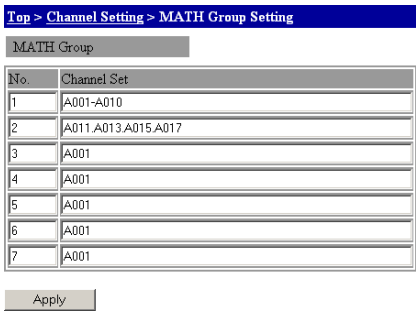
Enter a constant in the **Constant List** list.

Click the **Apply** button. This enables the settings changes.



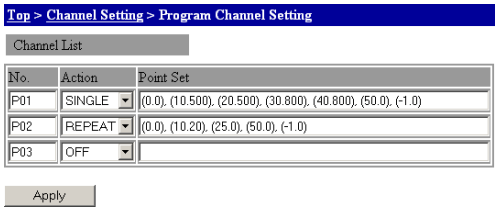
Setting MATH Groups

1. From the top screen, click **Channel Setting** > **MATH Group Settings**.
2. Enter the channel numbers to be grouped in the **Channel Set** box.
   Specify channel numbers by delimiting them with dots as in A001.A003.A006, or specify a range as in A004-A008.
3. Click the **Apply** button. This enables the settings changes.



Program Channel Settings

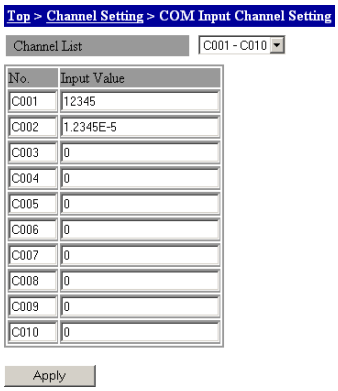
1. From the top screen, click **Channel Setting** > **Program Channel Setting**.
2. Select SINGLE or REPEAT in the **Action** box for the program channel number you wish to use.
3. Enter the elapsed time and setting value in the **Point Set** box. For information about formats, see section 1.13, “MATH Functions (/M1 Option).”
4. Click the **Apply** button. This enables the settings changes.



Setting Mode
Meas. Mode

Communication Input Data Settings

1. From the top screen, click **Channel Settings** > **COM Input Channel Setting**.
2. Select the channel group you wish to set from the **Channel List** list.
3. Enter the communication input data value in the **Input Value** box. For the range of available communication input values, see chapter 5, “Specifications.”
4. Click the **Apply** button. This enables the settings changes.



3.7 Setting Alarms

You can set the alarm type, alarm value, hysteresis, and output operation. For information about alarm types and other parameters, see section 1.3, “Functions of the Main Module.”During recording, only values can be changed.

Setting Mode
Meas. Mode

Alarm Setting (AI/DI)

You can set measurement channel alarms.

1. From the top screen, click **Channel Setting** > **Alarm Setting (AI/DI)**.
2. Select the channel group you wish to set from the **Channel List** list.

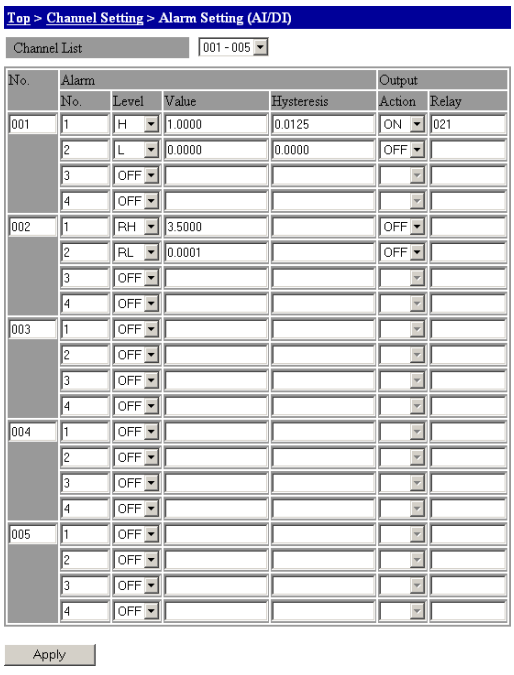
Alarm Settings

1. Select the alarm type from the **Level** list.
2. Enter an alarm value in the **Value** box.
3. Enter a hysteresis value in the **Hysteresis** box.

Output Settings

1. Turn output ON/OFF in the **Action** box.
2. Enter an alarm output channel in the **Relay** box.

Click the **Apply** button. This enables the settings changes.



Alarm Setting (MATH)

You can set MATH channel alarms.

1. From the top screen, click **Channel Setting** > **Alarm Setting (MATH)**.
2. Below, enter settings in the same manner as with measurement alarms. With MATH alarms, there is no hysteresis setting.

3.8 Digital Output Settings

Setting Mode

Relay Settings

You can set the operation type, excitation status, hold, operation, and reflash.

1. From the top screen, click **Channel Setting** > **DO Channel Setting**.
2. Select the channel group you wish to set from the Channel List list.

Relay Output Factor Settings

Select Relay output factor from the **Type** box. If you select ALARM, you must set Energize/De-energize, hold, operation, and re-alarm. If you select CommandDO(COM), you must set Energize/De-energize.

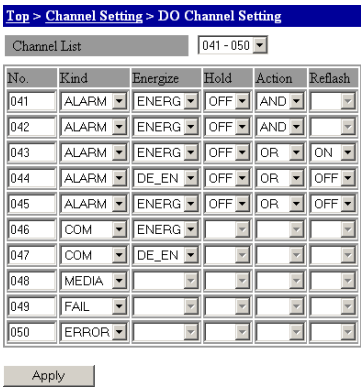
Energize Setting

Select to energize (ENERG) or de-energize (DE_EN) the relay in the Energize list.

Hold, Action, and Reflash Settings

1. To set the relay status to Hold in the **Hold** list, select ON.
2. Select a relay operation condition in the **Action** list.
3. Select ON in the **Reflash** list to perform the reflash function.

Click the **Apply** button. This enables the settings changes.


Top > Channel Setting > DO Channel Setting
Channel List
041 - 050
No. Kind Energize Hold Action Reflash
041 ALARM ENERG OFF AND
042 ALARM ENERG OFF AND
043 ALARM ENERG OFF OR ON
044 ALARM DE_EN OFF OR OFF
045 ALARM ENERG OFF OR OFF
046 COM ENERG
047 COM DE_EN
048 MEDIA
049 FAIL
050 ERROR
Apply

3.9 Analog/PWM Output Settings

Setting Mode

You can enter analog and PWM output settings.

1. From the top screen, click **Channel Setting** > **AO/PWM Channel Settings**.
2. Select the channel group you wish to set from the **Channel List** list.

Output Range Settings (Analog Output)

You can set the output type, action, range, span, preset value, and reference channel.

Output Types

In the **Mode** box, select AO to output or SKIP to not output.

Output Action Setting

Select TRANS (transmission output) or COM (arbitrary output) in the **Action** box.

Output Range Settings

Select 10 V (voltage output) or 20 mA (current output) in the **Range** box.

Span Setting

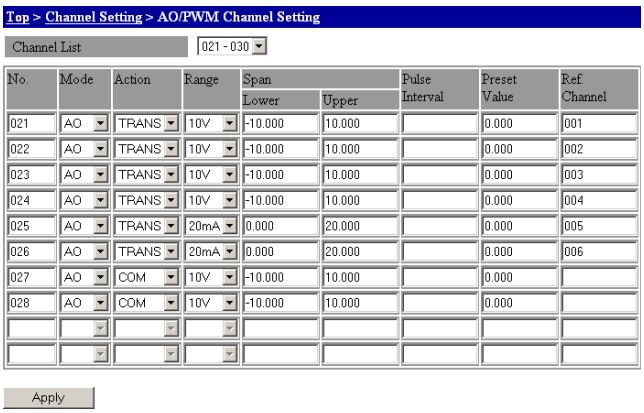
Select the actual output range from the allowed output range.
Enter the lower limit of span in the **Lower** box under **Span**. Also, enter the upper limit value in the **Upper** box.

Preset Value

In the **Preset Value** box, enter a preset value for the output operation when turning on the power or when an error occurs. When a preset value is selected in the output operation settings, the specified value is output.

Reference Channel Settings

Enter an input channel or MATH channel for transmission output in the **Reference Channel** box. This is set if TRANS is selected for the output action.


Top > Channel Setting > AO/PWM Channel Setting
Channel List
021 - 030
No.
Mode
Action
Range
Span
Lower
Upper
Pulse Interval
Preset Value
Ref. Channel
021 AO TRANS 10V -10.000 10.000 0.000 001
022 AO TRANS 10V -10.000 10.000 0.000 002
023 AO TRANS 10V -10.000 10.000 0.000 003
024 AO TRANS 10V -10.000 10.000 0.000 004
025 AO TRANS 20mA 0.000 20.000 0.000 005
026 AO TRANS 20mA 0.000 20.000 0.000 006
027 AO COM 10V -10.000 10.000 0.000
028 AO COM 10V -10.000 10.000 0.000
Apply

Output Range Settings (PWM Output)

You can set the output type, action, range, span, pulse interval, preset value, and reference channel.

Output Type

In the **Mode** box, select PWM to output or SKIP to not output.

Output Action Settings

Select TRANS (transmission output) or COM (arbitrary output) in the **Action** box.

Setting the Pulse Resolution

Select the pulse resolution in the **Range** box.

Span Setting

Select the actual output range from the allowed output range.
Enter the lower limit of span in the **Lower** box under **Span**. Also, enter the upper limit value in the **Upper** box.

Pulse Interval

In the **Pulse Interval** box, enter a coefficient that determines the pulse interval.

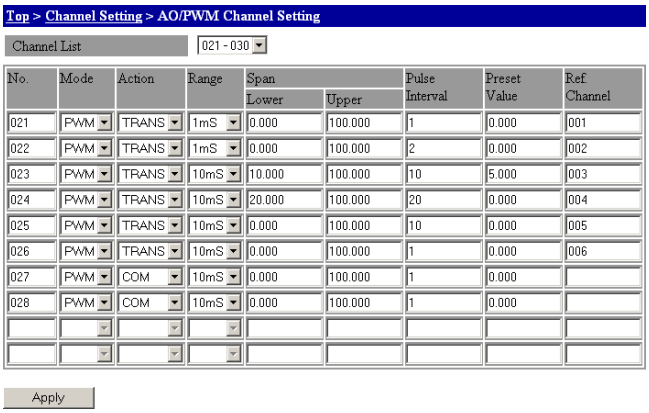
Preset Value

In the **Preset Value** box, enter a preset value for the output operation when turning on the power or when an error occurs. When a preset value is selected in the output operation settings, the specified value is output.

Reference Channel Settings

Enter an input channel or MATH channel for transmission output in the **Ref. Channel** box. This is set if TRANS is selected for the output method.

Click the **Apply** button. This enables the settings changes.


Top > Channel Setting > AO/PWM Channel Setting
Channel List
021 - 030
No.
Mode
Action
Range
Span
Lower
Upper
Pulse Interval
Preset Value
Ref. Channel
021 PWM TRANS 1mS 0.000 100.000 1 0.000 001
022 PWM TRANS 1mS 0.000 100.000 2 0.000 002
023 PWM TRANS 10mS 10.000 100.000 10 5.000 003
024 PWM TRANS 10mS 20.000 100.000 20 0.000 004
025 PWM TRANS 10mS 0.000 100.000 10 0.000 005
026 PWM TRANS 10mS 0.000 100.000 1 0.000 006
027 PWM COM 10mS 0.000 100.000 1 0.000
028 PWM COM 10mS 0.000 100.000 1 0.000
Apply

Output Operation Settings

You can set the operation upon power ON and when an error occurs.

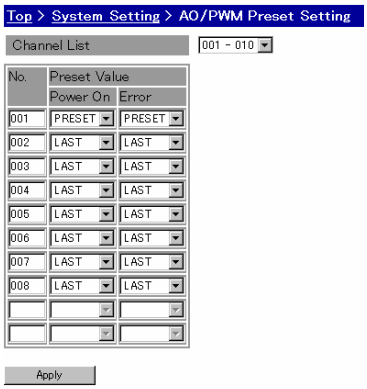
1. From the top screen, click **System Setting** > **AO/PWM Preset Setting**.
2. Select the channel group you wish to set from the **Channel List** list.

Setting the Power ON Operation

Select LAST or PRESET in the **Power ON** list under **Preset Value**.
When PRESET is selected, the specified value is output in the output range setting screen.

Setting the Operation upon Error Occurrence

Select LAST or PRESET in the **Error** list under **Preset Value**.
When PRESET is selected, the specified value is output in the output range setting screen.



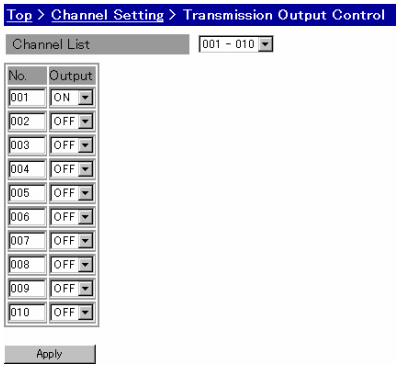
Meas. Mode

Transmission Output Control

Turning Transmission Output ON and OFF for Analog Output/PWM Output

This is set if TRANS is selected for the output action in the output range settings.

1. From the top screen, click **Channel Setting** > **Transmission Output Control**.
2. Select the channel group you wish to set from the **Channel List** list.
3. Select ON or OFF in the **Output** list of the channel number you wish to set.
4. Click the **Apply** button. Starts transmission output on channels set to ON.



3.10 Event/Action Settings

By linking the Event function and Action function, you can control the operations of the MW100.

Setting Mode

1. From the top screen, click **System Setting** > **Event/Action Setting**.
2. Select the number group of the Event / Action you wish to set from the list.

Selecting the Event Type

1. Select the event (event function) type in the **Event** list of the number you wish to set. Depending on this setting, the **Channel** box may become enabled, meaning that the settings in steps 2 and 3 are required.
2. In the **Channel** box, enter the number (channel number, relay number, etc.) for the event selected in the event type selection in step 1.
3. If the event type is ALARM_CH, select the alarm level number for the event in the **Channel** box.

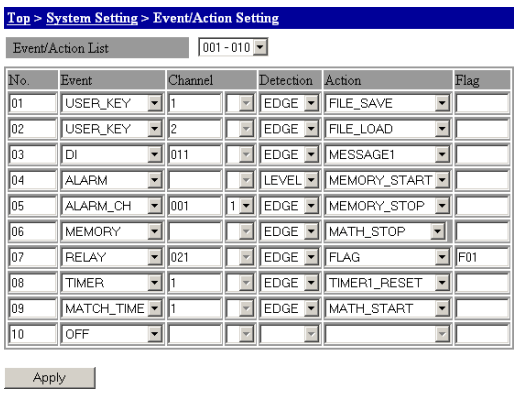
Selecting the Event Detection Method

Select the event detection method from the **Detection** list. The action (action function) that can be selected varies depending on the item selected for the detection method.

Selecting the Action Type

1. Select the action (Action function) type from the **Action** list. If Flag is selected for the action, the **Flag** box is enabled, meaning that the setting in step 2 is required.
2. Enter a flag number in the **Flag** box.

Click the **Apply** button. This enables the settings changes.


Top > System Setting > Event/Action Setting
Event/Action List
001 - 010
No. Event Channel Detection Action Flag
01 USER_KEY 1 EDGE FILE_SAVE
02 USER_KEY 2 EDGE FILE_LOAD
03 DI 011 EDGE MESSAGE1
04 ALARM LEVEL MEMORY_START
05 ALARM_CH 001 1 EDGE MEMORY_STOP
06 MEMORY EDGE MATH_STOP
07 RELAY 021 EDGE FLAG F01
08 TIMER 1 EDGE TIMER1_RESET
09 MATCH_TIME 1 EDGE MATH_START
10 OFF
Apply

3.11 Timer and Match Time Settings

The time up action function can be controlled through the specified time interval and time.

Setting Mode

Timer Settings

From the top screen, click **System Setting** > **Timer Setting**.

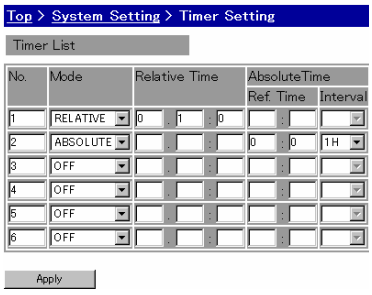
Relative Time Timer

1. Select RELATIVE in the **Mode** list.
2. Enter the desired time interval in the **Relative Time** boxes. The **day**, **hour**, and **minute** are arranged in order from the left.

Absolute Time Timer

1. Select ABSOLUTE in the **Mode** list.
2. Enter the desired reference time in the **Ref. Time** boxes under Absolute Time. The **hour** and **minute** are in order from the left in the box.
3. Select the time interval you wish to set in the **Interval** list under Absolute Time. **M** and **H** indicate the minute and hour respectively.

Click the **Apply** button. This enables the settings changes.



Setting the Match Time

From the top screen, click **System Setting** > **Match Time Setting**.

Monthly Timeup

1. Select MONTH in the **Mode** list.
2. Enter the desired date and time in the **Time** list. The **day**, **hour**, and **minute** are arranged in order from the left.

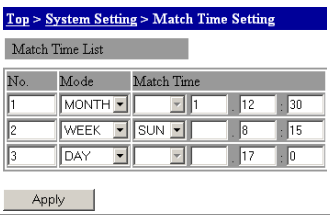
Weekly Timeup

1. Select WEEK in the **Mode** list.
2. Select a day of the week from the **Time** list, and enter the desired time in the **Time** box. Enter the **hour** and **minute** in the second and third box from the left, respectively.

Weekly Timeup

1. Select DAY in the **Mode** list.
2. Enter the desired time in the **Time** box. Enter the **hour** and **minute** in the second and third box from the left, respectively.

Click the **Apply** button. This enables the settings changes.



3.12 Scale Input Methods

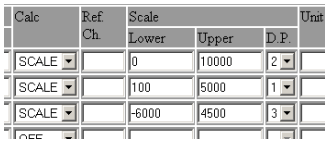
Scale Values

The following explains the methods for inputting scale values.

Enter only the desired number of digits in the box for the upper and lower limit values of scale. Select the number of digits after the decimal point from the list.

Desired Scale	Number Input	Decimal Point Position
0.00 to 100.00	Lower limit: 0 Upper limit: 10000	2
10.0 to 500.0	Lower limit: 100 Upper limit: 5000	1
–6.000 to 4.500	Lower limit: –6000 Upper limit: 4500	3

Example of a filled in screen.



3.13 Starting and Stopping Measurement, Computation, and Recording

This is an explanation of the procedure for starting and stopping measurement, computation, and recording. These operations can be performed by pressing keys on the MW100 main module, or from a browser.

Starting and stopping of measurement, computation, and recording must be performed one at a time.

Starting and Stopping Measurement

Using Main Module Keys

- **Starting Measurement**
  While measurement is stopped, briefly press the **START** key. Measurement starts and the unit switches to Measurement mode.
- **Stopping Measurement**
  While recording and computation are stopped, briefly press the **STOP** key. Measurement stops and the unit switches to Setting mode.

Using a Browser

- **Starting Measurement**
  In the **Status** table in the top screen, select **START** from the **Operation** list under the Measurement item. Measurement starts and the unit switches to Measurement mode.
- **Stopping Measurement**
  In the **Status** table in the top screen, select **STOP** from the **Operation** list under the Measurement item. Measurement stops and the unit switches to Setting mode.

Starting and Stopping Computation

This function is enabled when the MATH function (/M1) option is installed. You can use the function when MATH channels are set.

Using Main Module Keys

- **Computation Start**
  While recording is stopped, and during measurement, briefly press the **START** key. Computation starts.
- **Computation Stop**
  During computation, and while recording is stopped, briefly press the **STOP** key. Computation stops.

Using a Browser

The main module can be switched to Measurement mode. This is done while recording is stopped.

- **Starting Computation**
  1. From the top screen, click **Single Screen** or **Dual Screen** under the Monitor item.
  2. Click the **Start** computation icon. Computation starts.
- **Stopping Computation**
  1. From the top screen, click **Single Screen** or **Dual Screen** under the Monitor item.
  2. Click the **Stop** computation icon. Computation stops.

For information about the operation screen, see section 3.16, “Measured Data Monitor Display/Settings.”

Starting and Stopping Recording

Using Main Module Keys

- **Starting Recording**
  During measurement, hold down the **START** key for two or more seconds. Recording starts.
- **Stopping Recording**
  During recording, hold down the **STOP** key for two or more seconds. Recording stops.

Using a Browser

The main module can be switched to Measurement mode.

- **Starting Recording**
  1. From the top screen, click **Single Screen** or **Dual Screen** under the Monitor item.
  2. Click the **Start Recording** icon. Recording starts.
- **Stopping Recording**
  1. From the top screen, click **Single Screen** or **Dual Screen** under the Monitor item.
  2. Click the **Stop Recording** icon. Recording stops.

For information about the operation screen, see section 3.16, “Measured Data Monitor Display/Settings.”

Computation and Recording According to Status

You can control the status of measurement, recording, and computation on the main module according to changes in status. For details, see section 3.3, “System Settings.”

Checking the Operating Status of the MW100 Using the Status Indicators

You can confirm the operational status of the MW100 by viewing the status indicators on the front panel.

MEASURE

Behavior	Color	Indication
Off	--	Setting mode
On	Green	Measurement mode

RECORD

Behavior	Color	Indication
Turning Off	--	Recording stopped
On	Green	Recording
Blinking	Green	Transitioning from recording to recording stop

ALARM

Behavior	Color	Indication
Turning Off	--	No alarm
On	Red	Alarm active or alarm hold

MATH

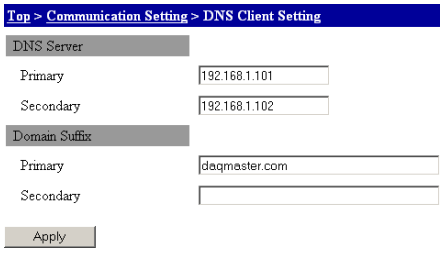
Behavior	Color	Indication
Turning Off	--	Computation stopped
On	Green	Computing
Blinking	Green	Transitioning from computing to computing stopped

3.14 Network Utility Settings

Setting Mode

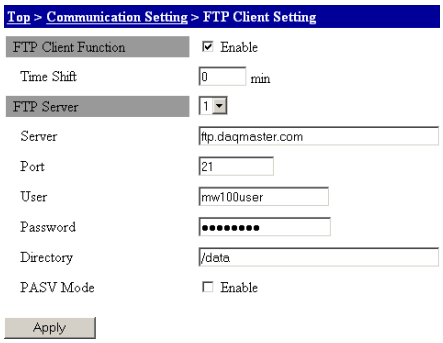
DNS Client Settings

1. From the top screen, click **Communication Setting** > **DNS Client Setting**.
2. In the **Primary** and **Secondary** boxes under DNS Server, enter the IP addresses of the respective DNS servers.
3. In the **Primary** and **Secondary** boxes under Domain Suffix, enter the domain name.
4. Click the **Apply** button.



FTP Client Settings

1. From the top screen, click **Communication Setting** > **FTP Client Setting**.
2. Select the **Client function** check box to enable the function.
3. Enter the shift amount (in minutes) in the Transfer **time shift** box.
4. Select the number of the destination to be set in the **Destination** list. You can set up to two destinations.
5. Enter the server name in the **Server Name** box.
6. Enter the server port number in the **Port Number** box.
7. Enter the user name in the **User Name** box.
8. Enter the password in the **Password** box.
9. Enter the folder to be accessed when opening a connection in the **Directory** box.
10. You can select the **PASV Mode** check box to use FTP passive mode.
11. Click the **Apply** button.

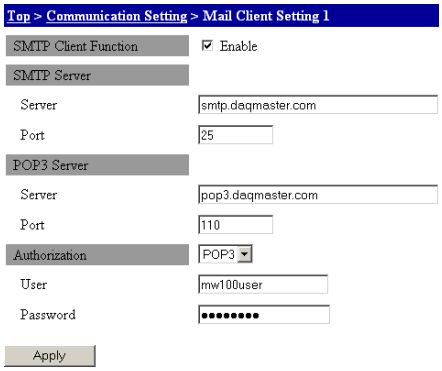


Mail Client Settings

These settings configure the e-mail function. The setting screen contains mail client setting 1 and mail client setting 2.

Mail Client Setting 1

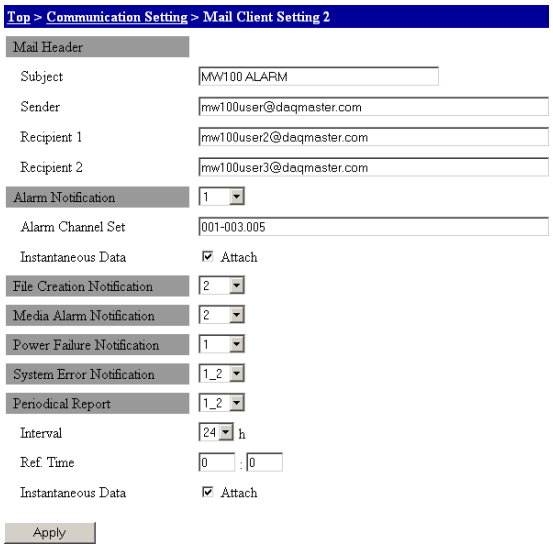
1. From the top screen, click **Communication Setting** > **Mail Client Setting 1**.
2. Select the **SMTP Client Function** check box. This enables e-mail transmission.
3. Enter the name of the SMTP server in the **Server Name** box under **SMTP Server**.
4. Enter the SMTP server port number in the **Port** box under **SMTP Server**.
5. Enter the name of the POP3 server in the **Server** box under **POP3 Server**.
6. Enter the POP3 server port number in the **Port** box under **POP3 Server**.
7. To require authorization (POP before SMTP) when sending e-mail, select **POP3** in the **User Authorization** list. This enables entry of the **User Authorization** items.
8. Enter the name for logging into the POP3 server in the **User** box under **User Authorization**.
9. Enter the password for logging into the POP3 server in the **Password** box under **User Authorization**.
10. Click the **Apply** button.



Mail Client Setting 2

1. From the top screen, click **Communication Setting** > **Mail Client Setting 2**.
2. Enter the subject of the e-mail in the **Subject** box under **Mail Header**. Up to thirty-two alphanumeric characters can be input.
3. Enter the sender mail address in the **Sender** box.
4. Enter the recipient address in the **Recipient 1** box. Enter the address for **Recipient 2** in the same manner. You can specify multiple addresses for each recipient. Separate each address with a space. You do not have to set both recipients. Use up to 150 alphanumeric characters.
5. To set up alarm notification, select an address for alarm notification in the **Alarm Notification** list. 1_2 sends notification to both recipient 1 and 2.
6. Enter an alarm notification channel in the **Alarm Channel Set** box under **Alarm Notification**. To add instantaneous values, select the Instantaneous **Data** check box. Specify channel numbers by delimiting them with dots as in 001.003.005, or specify a range as in 004-008.

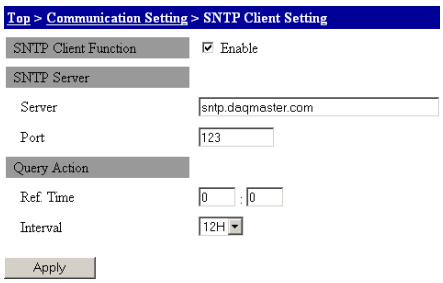
7. To set up notification of data file creation, select a notification address in the **File Creation Notification** list.
8. In the same manner as in step 7, set **Media Alarm Notification** , **Power Failure Notification** , and **System Error Notification**.
9. To set up Periodic Report notification, select an address for notification in the **Periodic Report** list.
10. Select transmission interval time from the **Interval** box under **Periodic Report**.
11. Enter a reference time for the send interval in the **Time** box under **Periodic Report**.
12. To add instantaneous values, select the **Instantaneous Data** check box under **Periodic Report**.
13. Click the **Apply** button.



Time Synchronization Client Settings

Enter these settings to automatically synchronize the time.

1. From the top screen, click **Communication Setting** > **SNTP Client Setting**.
2. Select the **SNTP Client Function** check box to enable the function.
3. Enter the name of the NTP server in the **Server** box under **SNTP Server**.
4. Enter the SNTP server port number in the **Port** box.
5. Enter a reference time to be queried **Time** box under **Query Action**. Next, select a query time interval in the **Interval** list.
6. Click the **Apply** button.



Server Settings

These settings enable the various server functions.

Keep Alive Function

Select the **TCP Keep Alive** check box to enable the function.

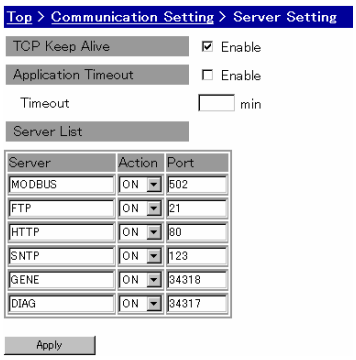
Communication Timeout Function

1. Select the **Application Timeout** check box to enable the function.
2. Enter the time in minutes until the timeout in the **Timeout** box.

Server List Settings

1. To use a server, turn it **ON** in the **Action** box of the corresponding server name.
2. Enter the port number used by the server in the **Port** box. Normally, you can use the default setting.

Click the **Apply** button.



3.15 Saving and Loading Setup Data

You can save and load MW100 main unit settings.

Saving and Loading Setup Data

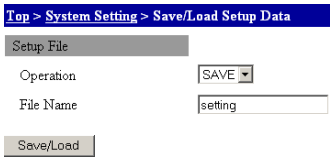
From the top screen, click **System Setting** > **Save/Load Setup Data**.

Saving Settings

1. Select SAVE in the **Operation** list.
2. Enter a file name in the **File Name** box, then click the **Save/Load** button.The extension cannot be input (it is fixed at PNL). If you enter an existing file name, the existing file is overwritten.

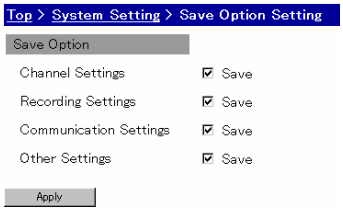
Loading Settings

1. Select LOAD in the **Operation** list.
2. Enter a file name in the **File** box, then click the **Save/Load** button.



Setup Data Save Conditions

1. From the top screen, click **System Setting** > **Save Option Setting**.
2. Select the **Channel Setting** check box to save.
3. Select the **Recording Setting** check box to save.
4. Select the **Communication Setting** check box to save.
5. Select the **Other Setting** check box to save.
6. Click the **Apply** button.



3.16 Measured Data Monitor Display/Settings

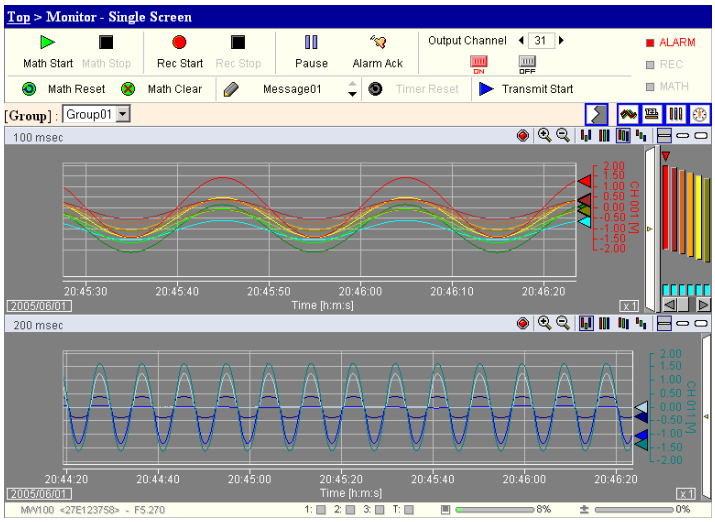
You can monitor-display data measured on the MW100.
The screen consists of Screen display 1 and Screen display 2, and for each you can select trend display, numerical display, meter display, or bar graph display.

Meas. Mode

Monitor-Display of Measured Data

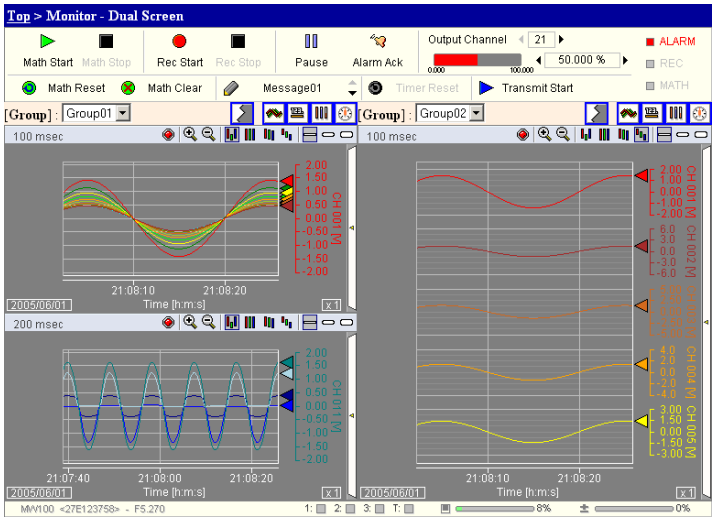
Single Screen

Use this when the monitor contains a single screen. You can display one group.
From the top screen, click **Single Screen**.



Dual Screen

Use this when the monitor contains two screens. You can display two groups.
From the top screen, click **Dual Screen**.



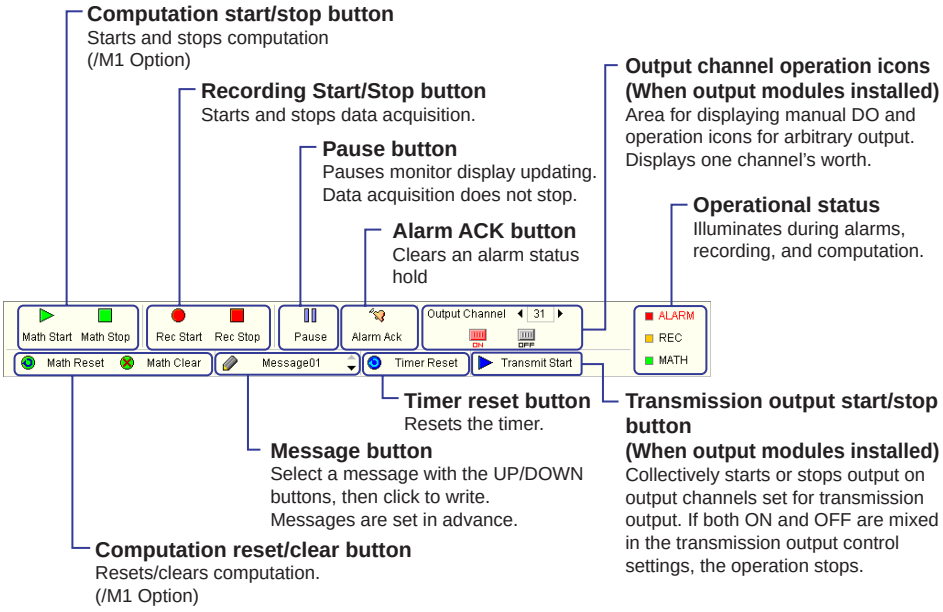
Explanation of Display Items

This is an explanation of the icons and measured data display items used in the monitor screen.

Record Start/Stop, Computation Start/Stop

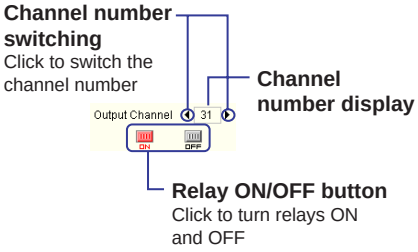
Used to start and stop data acquisition.
The icons of all functions are shown in the figure for the sake of explanation, but normally buttons are dimmed when disabled.

- **Operation Icons**

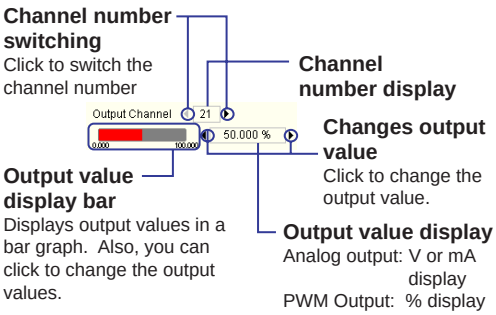

Computation start/stop button
Starts and stops computation (/M1 Option)
Recording Start/Stop button
Starts and stops data acquisition.
Pause button
Pauses monitor display updating. Data acquisition does not stop.
Alarm ACK button
Clears an alarm status hold
Output channel operation icons (When output modules installed)
Area for displaying manual DO and operation icons for arbitrary output. Displays one channel's worth.
Operational status
Illuminates during alarms, recording, and computation.
Math Start
Math Stop
Rec Start
Rec Stop
Pause
Alarm Ack
Output Channel
31
ALARM
REC
MATH
Math Reset
Math Clear
Message01
Timer Reset
Transmit Start
Timer reset button
Resets the timer.
Transmission output start/stop button (When output modules installed)
Collectively starts or stops output on output channels set for transmission output. If both ON and OFF are mixed in the transmission output control settings, the operation stops.
Message button
Select a message with the UP/DOWN buttons, then click to write. Messages are set in advance.
Computation reset/clear button
Resets/clears computation. (/M1 Option)

- **Output Channel Operation Icons**

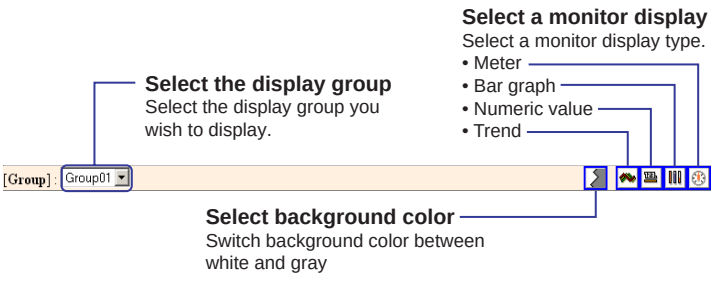
Manual DO channel:



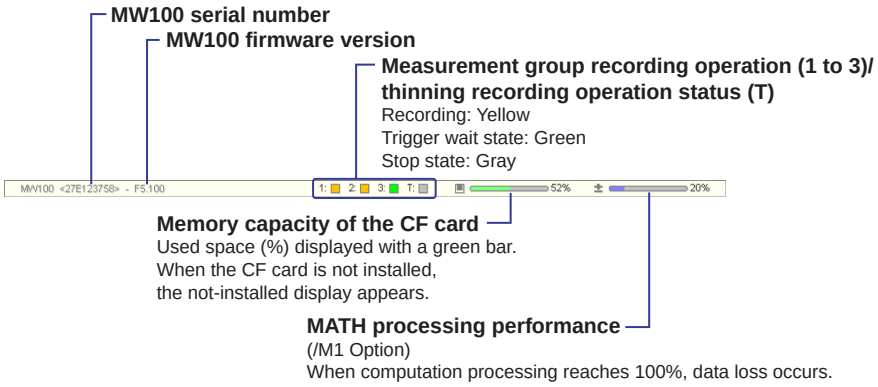
Arbitrary output channel:


Channel number switching
Click to switch the channel number
Channel number display
Output Channel
21
50.000 %
0.000
100.000
Changes output value
Click to change the output value.
Output value display bar
Displays output values in a bar graph. Also, you can click to change the output values.
Output value display
Analog output: V or mA display
PWM Output: % display

Monitor Display Switching and Group Selection

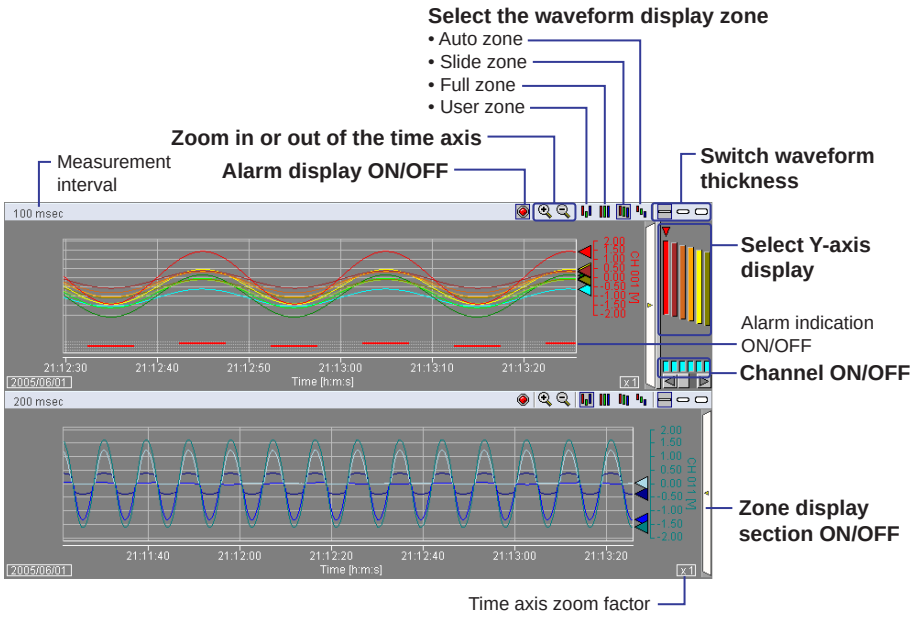


Contents of the Status Bar


MW100 serial number
MW100 firmware version
Measurement group recording operation (1 to 3)/
thinning recording operation status (T)
Recording: Yellow
Trigger wait state: Green
Stop state: Gray
MW100 <27E123758> - FS.100
1: 2: 3: T:
52%
20%
Memory capacity of the CF card
Used space (%) displayed with a green bar.
When the CF card is not installed,
the not-installed display appears.
MATH processing performance
(/M1 Option)
When computation processing reaches 100%, data loss occurs.

Monitor Display Screen

- **Trend Display**

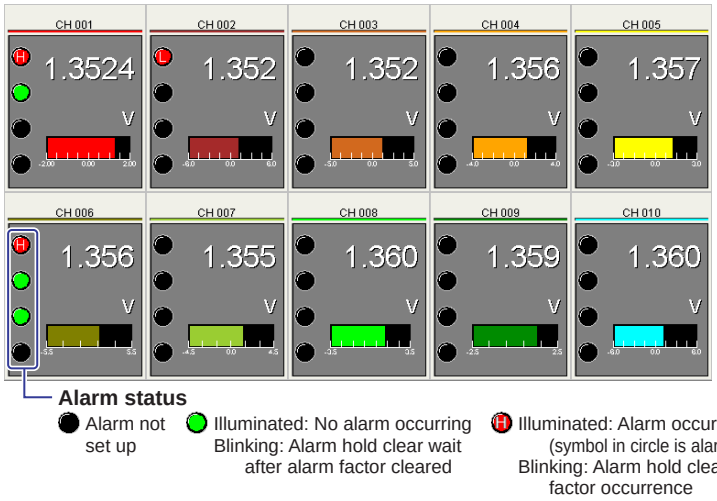


Selecting the Display Zone of Waveforms

- User Zone
  Displays each waveform at the position of the Zone specified in the Display Scale. The Y-axis displays active channels.
- Full Zone
  Each waveform is displayed in the full zone of the waveform display area. The Y-axis displays active channels.
- Slide Zone
  Each waveform is displayed slightly staggered across the waveform display area. The Y-axis displays active channels.
- Auto Zone
  The waveform display area is divided up according to the number of displayed waveforms.

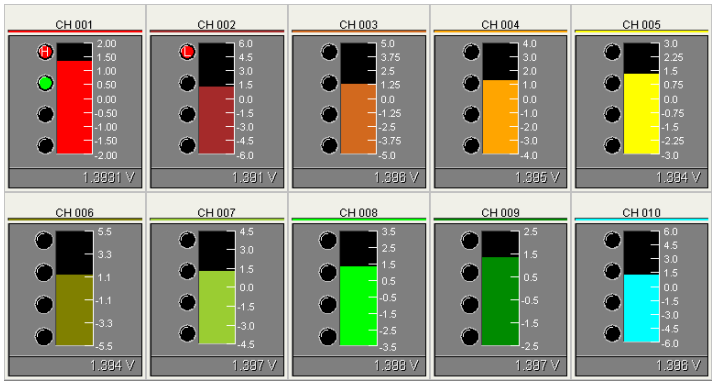
- **Numerical Display**

  Displays measured data as numerical values. When alarms are set, the alarm status is displayed to the left of the numerical value.



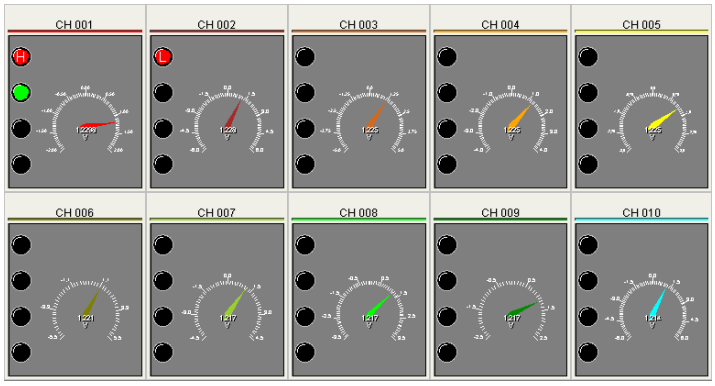
- **Bar Graph**

  Displays measured values in a bar graph. When alarms are set, the alarm status is displayed to the left of the bar graph. For information on alarm statuses, see Numerical Display in this section.



- **Meters**

  Displays measured values in a meter. When alarms are set, the alarm status is displayed to the left of the meter. For information on alarm statuses, see Numerical Display in this section.



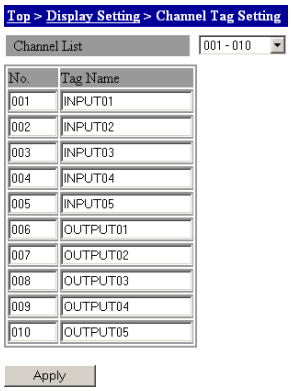
Setting Mode

Display Settings

Tag Settings

Enter Tag names to assign to measurement and MATH channels.

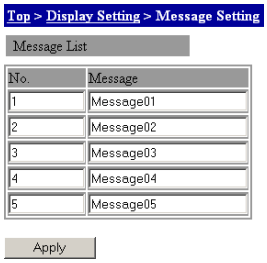
1. From the top screen, click **Display Setting** > **Channel Tag Setting**.
2. Select the tag number group you wish to set from the **Channel List** list.
3. Enter a tag name in the **Tag** box of each tag number. You can use fifteen alphanumeric characters.
4. Click the **Apply** button.



Message Settings

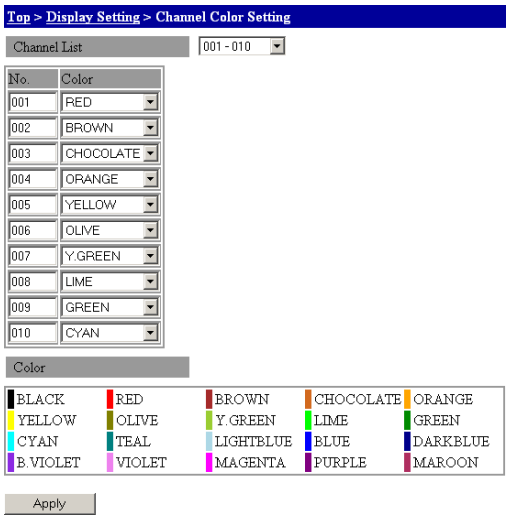
You can specify a message to be written along with data saving during recording.

1. From the top screen, click **Display Setting** > **Message Setting**.
2. Enter the message in the **Message** box in the Message List. You can use fifteen alphanumeric characters.
3. Click the **Apply** button.



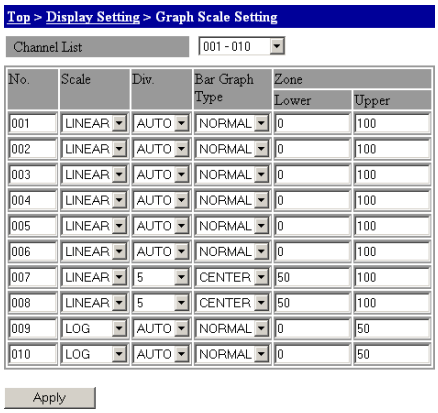
Setting Display Colors

1. From the top screen, click **Display Setting** > **Channel Color Setting**.
2. Select the channel group you wish to set from the **Channel List** list.
3. Select the color you wish to assign in the **Color** list of each channel. Color samples are shown towards the bottom of the screen
4. Click the **Apply** button.



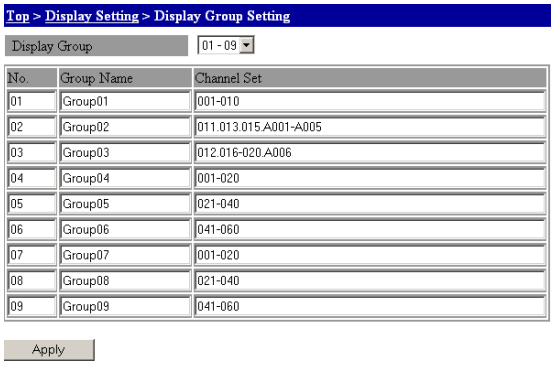
Display Scale Settings

1. From the top screen, click **Display Setting** > **Group Scale Setting**.
2. Select the channel group you wish to set from the **Channel List** list.
3. Select LINEAR or LOG in the **Scale** list.
4. Select the number of divisions in the **Div** list. It can only be selected when set to LINEAR display. If you select AUTO, the number of divisions is determined automatically from the scale or span of the specified channel.
5. Select a display position of NORMAL or CENTER in the **Bar Graph Type** list. The numerical or bar graph display is updated accordingly.
6. Specify a percentage from the top or bottom in the **Zone** boxes. Enter a Lower value of 0 to 95 (%), and an upper value from 5 to 100 (%).
7. Click the **Apply** button.


Top > Display Setting > Graph Scale Setting
Channel List
001 - 010
No.
Scale
Div.
Bar Graph Type
Zone
Lower
Upper
001 LINEAR AUTO NORMAL 0 100
002 LINEAR AUTO NORMAL 0 100
003 LINEAR AUTO NORMAL 0 100
004 LINEAR AUTO NORMAL 0 100
005 LINEAR AUTO NORMAL 0 100
006 LINEAR AUTO NORMAL 0 100
007 LINEAR 5 CENTER 50 100
008 LINEAR 5 CENTER 50 100
009 LOG AUTO NORMAL 0 50
010 LOG AUTO NORMAL 0 50
Apply

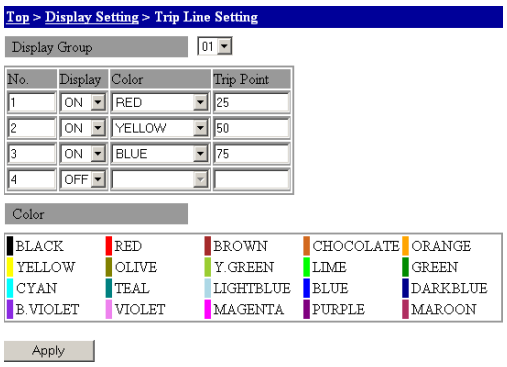
Display Groups Settings

1. From the top screen, click **Display Setting** > **Group Setting**.
2. Select the group you wish to set from the **Display Group** list.
3. Enter the group name in the **Group Name** box (using up to fifteen characters).
4. Enter the channel numbers you wish to assign to the group in the **Channel Set** box. Specify channel numbers by delimiting them with dots as in 001.003.005, or specify a range as in 004-008. Up to twenty channels (one hundred characters) can be specified.
5. Click the **Apply** button.



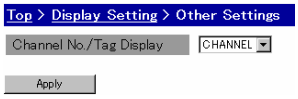
Trip Line Setting

1. From the top screen, click **Display Setting** > **Trip Line Setting**.
2. Select the group number you wish to set from the **Display Group** list.
3. Turn **ON** the line you wish to display in the **Display** list.
4. Select the color you wish to display in the **Color** list. Color samples are shown toward the bottom of the screen.
5. Specify a percentage for the position of the trip line in the **Trip Point** box. 100% is the scale maximum in the trend display, and 0% is the minimum.
6. Click the **Apply** button.



Other Settings

1. From the top screen, click **Display Setting** > **Other Settings**.
2. Select whether to display channel numbers or tag names in the **Channel/No. Tag Display** list.
3. Click the **Apply** button.



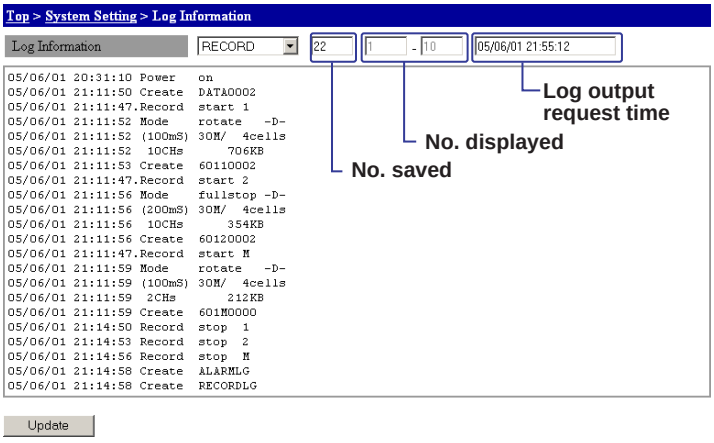
Setting Mode
Meas. Mode

Log Information

You can display information from the data acquisition log, alarm summaries, and other sources. For information about display contents, see the MW100 Communication Command manual (IM MW100-17E).

Log Information

1. From the top screen, click **System Setting** > **Log Information**.
2. Select the type of log you wish to display in the **Log Information** list. Enter the number of lines to display in the box to the right of the list.
3. Click the **Update** button. The updated time is displayed in the display box aligned with the **Log Information** list, and the updated time current log information is displayed in the log display area.



4.1 Error Display on the 7-Segment LED and Corrective Actions

The main module has a two-digit 7-segment LED. The 7-segment LED displays the system status. This section describes the displays on the 7-segment LED when errors occur on the system and their corrective actions. For information about normal displays other than for errors, see section 1.3, “Functions of the Main Module.”

If servicing is necessary, or if the instrument is not operating correctly after performing the corrective actions below, contact your nearest YOKOGAWA dealer.

Errors upon Startup

The left and right digits of the 7-segment LED display “b” and an error code, respectively. The LED illuminates.

Display	Probable Cause	Corrective Action	Ref. section
b* (where * is any character other than F).	The dip switch settings are not correct.	Turn OFF the power, remove the CF card, turn ON all dip switches, and power up again. If the situation does not change servicing is required.	1.3
bF.	The dip switch settings are not correct.	Powering up in setup reset mode. Turn OFF the power, turn ON all dip switches, and power up again. Since all settings such as the IP address are initialized, reconfiguration is necessary.	1.3

System Errors

The left and right digits of the 7-segment LED display “F” and an error code, respectively. The LED illuminates.

Display	Possible Problem	Corrective Action	Ref. section
F0	System ROM error.	Servicing required.	-
F1	SRAM error	Servicing required.	-
F2	EEPROM error	Servicing required.	-
F3	Error in the internal battery of the main module.	Servicing required. However, this error is also displayed immediately after the battery is replaced. If this happens, power-cycle the MW100.	-
F4	Ethernet controller error	Servicing required.	-
F6	Web file load error	Servicing required.	-
FF	Error in writing unit information	Servicing required.	-

Module Errors

The left and right digits of the 7-segment LED display are U and an error code, respectively. The LED illuminates.
In the case of module errors, the error number and the corresponding module number are displayed alternately as shown in the figure below.

Display	Possible Problem	Corrective Action	Ref. section
U0	Range information error.	Servicing required.	-
U1	Calibration value error.	Check the module’s installation status, then recalibrate the module. If the error occurs even after recalibrating, servicing is required.	-
U2	Calibration reference voltage value is not correct. (during calibration)	Check whether the correct calibration reference voltage is being applied or whether the channel to which the voltage is applied is correct.	-
U3	Error in writing the calibration value.	Servicing required.	-
U4	The installed module cannot be used.	Replace the module with one that can be used.	-

Communication Errors

The left and right digits of the 7-segment LED display “C” and an error code, respectively. The LED blinks.

Display	Possible Problem	Corrective Action	Ref. section
C0	DHCP address acquisition error	Check network connections. Use a Fixed IP address Check with your network administrator whether your environment supports acquisition of addresses by DHCP.	2.6, 3.2 *
C1	DNS name error	Check network connections. Check with your network manager to determine whether your environment supports host name registration.	2.6 *

* See the MW100 Viewer Software User’s Manual (IM MW180-01E).

Settings Errors

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E001	Invalid function parameter.	Enter the correct parameter.
E002	Value exceeds the setting range.	Set a value within the allowable range.
E003	Incorrect real number format.	Use the correct real number format.
E004	Real number value exceeds the setting range.	Set a real number within the allowable range.
E005	Incorrect character string.	Set an allowable character string.
E006	Character string too long.	Set a character string within the allowable length.
E007	Incorrect display color format.	Specify a display color using the correct format.
E008	Incorrect date format.	Enter the date using the correct format.
E009	Data value exceeds the setting range.	Set a date within the allowable range.
E010	Incorrect time format.	Enter the time using the correct format.
E011	Time value exceeds the setting range.	Set a time within the allowable range.
E012	Incorrect time zone format.	Specify a time zone using the correct format.
E013	Time zone value exceeds the setting range.	Set a time zone within the allowable range.
E014	Incorrect IP address format.	Enter an IP address using the correct format.
E020	Invalid channel number.	Enter the correct channel number.
E021	Invalid sequence of first and last channel.	Set a value for the last channel that is greater than the first channel.
E022	Invalid alarm number.	Enter the correct alarm number.
E023	Invalid relay number.	Enter a correct relay number.
E024	Invalid sequence of first and last relay.	Set a value for the last relay that is greater than the first relay.
E025	Invalid MATH group number.	Enter a correct MATH group number.
E026	Invalid box number.	Enter the correct box number.
E027	Invalid timer number.	Enter the correct timer number.
E028	Invalid match time number.	Enter the correct match time number.
E029	Invalid measurement group number.	Enter a correct measurement group number.
E030	Invalid module number.	Enter a correct module number.
E031	Invalid start and end time of DST.	Enter a correct start and end time.
E032	Invalid display group number.	Enter a correct display group number.
E033	Invalid tripline number.	Enter a correct tripline number.
E034	Invalid message number.	Enter a correct message number.
E035	Invalid user number.	Enter a correct user number.
E036	Invalid server type.	Enter a correct destination type.
E037	Invalid e-mail contents.	Enter a correct send destination.
E038	Invalid server number.	Enter a correct server number.
E039	Invalid command number.	Enter a correct command number.

Display	Possible Problem	Corrective Action
E040	Invalid client type.	Enter a correct client type.
E041	Invalid server type.	Enter a correct server type.
E050	Invalid input type.	Enter an input type that can be selected for the module specified by the channel number.
E051	Module of an invalid input type found in the range of specified channels.	Enter an input type that can be selected for all modules specified by the channel range.
E052	Invalid measuring range.	Enter a measuring range that can be selected for the module specified by the channel number.
E053	Module of an invalid measuring range found in the range of specified channels.	Enter a measuring range that can be selected for all modules specified by the channel range.
E054	Upper and lower limits of span cannot be equal.	Set a different value for the upper and lower limits of span.
E055	Upper and lower limits of scale cannot be equal.	Set a different value for the upper and lower limits of scale.
E056	Invalid reference channel number.	Set channels other than the input module's own channel.
E060	Cannot set an alarm for a skipped channel.	Set a type for the channel number setting other than SKIP.
E061	Cannot set an alarm for a channel on which MATH function is turned OFF.	Set the Use/Do not Use setting for expressions on the channel number to Use.
E062	Invalid alarm type.	Enter an allowed alarm type.
E063	Invalid alarm relay number.	Set a relay number for alarm output relays.
E065	Cannot set hysteresis for a channel on which alarm are turned OFF.	Set the channel number alarm type to something other than OFF.
E070	Nonexistent channel specified in MATH expression.	Check whether a channel number outside of the allowable range was specified in the expression.
E071	Nonexistent constant specified in MATH expression.	Check whether a MATH constant outside of the allowable range was specified in the expression.
E072	Invalid syntax found in MATH expression.	Check whether the syntax of the expression is correct.
E073	Too many operators for MATH expression.	Reduce the number of operators.
E074	Invalid order of operators.	Check whether the relationship between the operators used in the expression satisfies proper syntax.
E075	Upper and lower limits of MATH span cannot be equal.	Set a different value for the upper and lower limits of the MATH span.
E080	Incorrect MATH group format.	Check whether the MATH group format is correct.
E081	Incorrect channels for MATH group.	Check whether there are any channels outside the allowable range specified in the MATH group.
E082	Too many channels for MATH group.	Reduce the number of channels specified in the MATH group.
E090	Incorrect break point format.	Use the correct break point format.
E091	Time value of break point exceeds the setting range.	Set a time within the allowable range.
E092	Output value of break point exceeds the setting range.	Set an output value within the allowable range.
E093	No break point found.	Set one or more break points.
E094	Invalid time value of first break point.	Set the time of break point 1 to zero.
E095	Invalid time sequence found in break points.	Set the times of break points in ascending order.
E100	Invalid output type.	Enter an output type that can be selected for the module specified by the channel number.
E101	Module of an invalid output type found in the range of specified channels.	Enter an output type that can be selected for all modules specified by the channel range.
E102	Invalid output range.	Enter an output range that can be selected for the module specified by the channel number.
E103	Module of an invalid output range found in the range of specified channels.	Enter an output range that can be selected for all modules specified by the channel range.
E104	Upper and lower limits of output span cannot be equal.	Set a different value for the upper and lower limits of output span.
E105	Invalid transmission reference channel.	Set the channel for the input module.
E110	Invalid channel number for contact input event.	Set the channel number for the universal input module or DI module.

4.1 Error Display on the 7-Segment LED and Corrective Actions

Display	Possible Problem	Corrective Action
E111	Invalid channel number for alarm event.	Set an input module or MATH channel number.
E112	Invalid relay number for relay event.	Set the channel number for the DO module.
E113	Invalid action type.	Enter a correct action type.
E114	Invalid combination of edge and level detection actions.	Set the edge and level detection types to something different.
E115	Invalid combination of level detection actions.	Set events of different types to different actions in level detection.
E116	Invalid flag number.	Enter a correct flag number.
E120	Invalid measurement group number.	Set the measurement interval so that meas. gr 1 ≤ meas. gr 2 ≤ meas. gr 3. The maximum allowable ch for 10 ms measurement is 10, and for 50 ms, 30.
E121	Invalid measurement group number for MATH interval.	Set math interval to a measurement group of 100 ms or longer. When performing measurement by input module, set the measurement group number for executing measurement.
E130	Size of data file for measurement group 1 exceeds the upper limit.	Set the number of saved channels, recording interval, and recording data length so that the data file of measurement group 1 does not exceed 10 MB.
E131	Size of data file for measurement group 2 exceeds the upper limit.	Set the number of saved channels, recording interval, and recording data length so that the data file of measurement group 2 does not exceed 10 MB.
E132	Size of data file for measurement group 3 exceeds the upper limit.	Set the number of saved channels, recording interval, and recording data length so that the data file of measurement group 3 does not exceed 10 MB.
E133	Size of MATH data file exceeds the upper limit.	Set the number of saved channels, recording interval, and recording data length so that the MATH data file does not exceed 10 MB.
E134	Size of thinned data file exceeds the upper limit.	Set the number of saved channels, recording interval, and recording data length so that the thinned data file does not exceed 10 MB.
E135	Cannot set smaller value for thinning recording interval than measuring or MATH interval.	Set a value for the thinning recording interval higher than the measurement and MATH interval.
E136	Invalid combination of thinning recording, measuring and MATH interval.	Set a value for the thinning recording interval than is a common multiple of the measurement and MATH intervals.
E137	Cannot set smaller value for thinning recording data length than thinning recording interval.	Set a value for the thinning recording data length that is larger than the thinning recording interval.
E138	Cannot set recording operation for measurement group with no measuring interval.	Set the measurement interval of the measurement group number to something other than OFF.
E139	Invalid recording interval.	Set a recording interval which can be set to the measurement interval of the measurement group.
E140	Upper and lower limits of the display zone cannot be equal.	Set the upper and lower limits of display zone to a different value.
E141	Cannot set smaller value than lower limit of display zone for upper limit.	Set a larger value for the upper limit than that of the lower limit.
E142	Width of display zone must be 5% of that of the entire display or more.	Set the upper and lower limits so that the difference between them is 5% or more.
E145	Incorrect display group format.	Enter a display group of the correct format.
E146	Too many channels for display group.	Set 20 or fewer channels for a single group.
E150	IP address must belong to class A, B, or C.	Set an IP address belonging to class A, B, or C.
E151	Net or host part of IP address is all 0's or 1's.	Set a valid combination of IP address and subnet mask.
E152	Invalid subnet mask.	Enter a setting according to your network.
E153	Invalid gateway address.	Make sure that the net part of the IP address and default gateway match.
E160	Incorrect alarm e-mail channel format.	Specify a channel using the correct format.
E165	Invalid channel number for Modbus command.	Enter a correct channel.
E166	Invalid combination of start and end channel for Modbus command.	Set the first and last channel to the same type.

Display	Possible Problem	Corrective Action
E167	Invalid sequence of start and end channel for Modbus command.	Set the last channel equal or greater than the first channel.
E168	Too many channels for command number.	Set a valid number of channels for the data type.

Execution Error

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E201	Cannot execute due to different operation mode.	Confirm the operation mode.
E202	Cannot execute when in setting mode.	Change the mode before execution.
E203	Cannot execute when in measurement mode.	Change the mode before execution.
E204	Cannot change or execute while saving to memory.	Stop the save operation before executing.
E205	Cannot execute during MATH operation.	Stop the MATH operation before executing.
E206	Cannot change or execute during MATH operation.	Stop the MATH operation before executing.
E207	Cannot change or execute while saving/loading settings.	Execute after the settings are saved or loaded.
E211	No relays for communication input found.	Check installation of relays and the relay output types.
E212	Initial balance failed.	Check the wiring.
E213	No channels for initial balance found.	Check the target channels.
E214	No channels for transmission output found.	Specify channels for transmission output.
E215	No channels for arbitrary output found.	Specify channels for arbitrary output.
E221	No measurement channels found.	Check the measurement module, measurement group number, measurement interval, and other settings.
E222	Invalid measurement interval.	Set the measurement interval so that: Meas. gr 1 ≤ meas. gr 2 ≤ meas. gr 3
E223	Too many measurement channels.	The number of measurable channels during 10 ms measurement is 10, and for 50 ms measurement, 30.
E224	No MATH channels found.	Check the MATH channel settings.
E225	Invalid MATH interval.	Set the MATH interval to measurement groups of 100 ms or more. When measuring with measurement modules, set the measurement group numbers on which to perform measurement.
E226	Cannot start/stop MATH operation.	Cannot execute because MATH start is set for the level detection action.
E227	Cannot start/stop recording.	Cannot execute because MATH start is set for the level detection action.

Execution Errors

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E301	CF card error detected.	Do not eject or otherwise disturb the card while being accessed.
E302	No enough free space on CF card.	Delete unneeded files to free up space. Replace the CF card.
E303	CF card is write-protected.	Check write permissions.
E311	CF card not inserted.	Insert the CF card.
E312	Cannot format CF card.	Check the CF card.
E313	CF card damaged or not formatted.	Reinsert the CF card or format it.
E314	File is write-protected.	Check write permissions.
E315	No such file or directory.	Check the files and folders. *

* May occur in the MW100 internal processing (during an abnormality)

Display	Possible Problem	Corrective Action
E316	Number of files exceeds the upper limit.	Delete unneeded files to reduce the number of files.
E317	Invalid file or directory name.	Check the files and folders. *
E318	Unknown file type.	Check the files.
E319	Same name of file or directory already exists.	Check the files and folders. *
E320	Invalid file or directory operation.	Check the files and folders. *
E321	File is in use.	Wait until access is finished.
E331	Setting file not found.	Check the name of the setting file.
E332	Setting file is broken.	Could not load setting file because it is corrupted.
E341	FIFO buffer overflow.	You must reduce the time required to store files. Delete unneeded files to free up space.
E342	Data to be saved to file not found.	Check the settings.
E343	Power failed while opening file.	Files may have been damaged. Take appropriate action for power failure.
E344	Some or all data prior to power outage could not be recovered.	Do not change the CF card during a power failure.
E345	Could not restart recording after recovery from power outage.	Perform the record start operation.
E346	Recording could not be started due to power outage.	Perform the re-recording start operation. Take appropriate action for power failure.

* May occur in the MW100 internal processing (during an abnormality)

Communication Command Error

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E401	Command string too long.	Keep the command within 2047 Bytes from first character to terminator.
E402	Too many commands enumerated.	Set the number of enumerated commands within 99.
E403	Invalid type of commands enumerated.	Send the commands without enumerating them.
E404	Invalid command.	Confirm the command name.
E405	Not allowed to execute this command.	Login at a level that allows execution of this command.
E406	Cannot execute due to different operation mode.	Switch to a mode that allows execution of this command.
E407	Invalid number of parameters.	Check the number of parameters.
E408	Parameter string too long.	Keep the length of individual parameters within 512 Bytes.
E411	Daylight saving time function not available.	Not available with the current model.
E412	Temperature unit selection not available.	Not available with the current model.
E413	MATH option not available.	Not available with the current model.
E414	Serial communication interface option not available.	Not available with the current model.

Communication Error

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E501	Login first.	First, finish logging in.
E502	Login failed, try again.	Enter the correct user name and password.
E503	Connection count exceeded the upper limit.	Close unneeded connections and reconnect.
E504	Connection has been lost.	Try to make a new connection.
E505	Connection has time out.	Try to make a new connection.
E520	FTP function not available.	Enable the function.
E521	FTP control connection failed.	Check the FTP server address and the main unit address setting. Also check the Ethernet cable cannection.
E530	SMTP function not available.	Enable the function.
E531	SMTP connection failed.	Check the SMTP server address and the main unit address setting. Also check the Ethernet cable cannection.
E532	POP3 connection failed.	Check the POP3 server address and the main unit address setting. Also check the Ethernet cable cannection.
E550	SNTP function not available.	Enable the function.
E551	SNTP command/response failed.	Check the SNTP server address and the main unit address setting. Also check the Ethernet cable cannection.

System Errors

The code is divided into two parts which are displayed alternately on the 7-segment LED; in the first part, the letter E appears in the left digit with the hundreds digit of the error code to the right, and the second part consists of the last two digits of the error code.

Display	Possible Problem	Corrective Action
E999	System error.	Servicing required.

4.2 Error Display in the Monitor Screen and Corrective Actions

Error Message	Corrective Action
Could not connect to the instrument. Check cables and other connections.	Check Ethernet cable connections and the IP addresses of devices.
Communication error occurred. Check cables and other connections.	Check Ethernet cable connections and the IP addresses of devices.
The actually installed modules differ from the modules recognized by the system.	Reconstruct the module configuration.
The size of the data files exceeds the allowable upper limit.	Set the number of save channels, recording interval, and recording data length so that the data files of measurement groups 1, 2, and 3, and the computed and thinned data files are all within 10 MB.
Value smaller than measuring interval or MATH interval cannot be set for the thinning recording interval.	Set a value higher than the measurement and MATH interval.
Combination of thinning recording interval, measurement interval, MATH interval incorrect.	Set the thinning recording interval so that it is a common multiple of the measurement and MATH intervals.
The recording data length cannot be set equal to or less than the recording interval.	Set a recording data length larger than the recording interval.
Insufficient space on the CF card.	Delete unneeded files on the CF card to free up some space. Replace the CF card.
The CF card is not inserted.	Insert the CF card.
The CF card is damaged or not formatted.	Reinsert the CF card or format it.
No data found in file.	Check the recording settings.
Remove MATH start/stop action from the Event/Action settings.	Remove MATH start/stop action from the Event/Action settings.
Remove recording start/stop action from the Event/Action settings.	Remove recording start/stop action from the Event/Action settings.

4.3 Troubleshooting

If servicing is necessary, or if the instrument is not operating correctly after performing the corrective actions below, contact your nearest YOKOGAWA dealer.

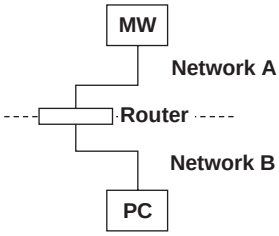
The 7-segment LED does not illuminate.

Possible Problem	Corrective Action	Ref. section
The power switch is not ON.	Turn ON the power switch.	2.5
The supply voltage is too low.	Check whether the voltage is within the supply voltage rating range.	2.5
The fuse is blown.	Servicing required.	-
The power supply is broken.	Servicing required.	-

The 7-segment LED blinks repeatedly.

Possible Problem	Corrective Action	Ref. section
The power supply is shorted inside the input/output module.	Remove the input/output module one by one and determine thebroken module (servicing required).	2.3
The power supply is shorted inside the main module.	Replace the main module. (Servicing required.)	2.3

The MW100 cannot be detected from the PC or cannot be detected with the Search button.

Possible Problem	Corrective Action	Ref. section
The LINK LED does not turn ON. The cable is broken.	Replace the Ethernet cable.	1.3
The LINK LED does not turn ON. There is a problem with the hub.	Check the hub's power supply. If it still does not work, replace the hub and check the hub's operation.	1.3
The LINK LED does not turn ON. There is a problem with the PC.	Check whether the PC can connect to the network. Replace the PC's NIC.	1.3
The ACT LED does not turn ON. There is a problem in the connection between the hub and the MW100.	Check the hub's power supply. If it still does not work, Replace the hub and check the hub's operation.	1.3
The ACT LED does not turn ON. There is a problem with the PC.	Check whether the PC can connect to the network. Replace the PC's NIC.	1.3
There is a problem in the network configuration. The settings are not correct.	Check that the IP address, subnet mask, and default gateway settings on the MW100 are correct.	*
There is a problem in the network configuration. The setting changes have not taken effect.	Turn OFF the power to the PC and the MW100, and carry out reconnection.	*
The PC and the MW100 are not in the same segment.	Connect the PC and the MW100 in the same network segment. If the PC and the MW100 are connected as shown in the following figure, the Search button cannot be used to detect the MW100. You can make the connection by manually specifying the IP address of the MW100.  	*
The firewall is enabled (when using Windows XP).	Disable the function.	

* See the MW100 Viewer Software User's Manual.

The MW100 can be detected using the Search button, but browser connection fails.

Possible Problem	Corrective Action	Ref. section
The IP address is set to the default value. The default value cannot be used to make the connection.	Enter the correct IP address.	*
There is a problem in the network configuration.	Check that the IP address, subnet mask, and default gateway settings on the MW100 are correct.	*

* See the MW100 Viewer Software User's Manual.

The Calibrator cannot connect to the MW100.

Possible Problem	Corrective Action	Ref. section
Attempting to make multiple connections.	Exit all other software programs.	4.3,*

* See the MW100 Viewer Software User's Manual.

The connected input/output module is not detected.

Possible Problem	Corrective Action	Ref. section
Module connection or module startup error. Attached the module while the power was ON.	Turn OFF the power. Detach the input/output module once and attach it again.	2.5
Carried out an incorrect calibration.	Recalibrate.	4.3,*

* See the MW100 Viewer Software User's Manual.

The measured value is not correct

Possible Problem	Corrective Action	Ref. section
The input wiring is not correct.	Check the input wiring.	2.4
The measured value is at +Over or –Over. The measurement range setting and input range do not match.	Change to an appropriate setting.	3.5
The temperature error is large or is unstable. The TC type setting and the type actually connected are different.	Change to the correct setting.	3.5
The temperature error is large or is unstable. The RJC setting is not correct.	Change to the correct setting.	3.5
The temperature error is large or is unstable. The wind is hitting the terminals.	Block the wind from hitting the terminals.	-
The temperature error is large or is unstable. The ambient temperature change is drastic.	Suppress changes in the ambient temperature such as by inserting it into a box.	-
The temperature error is large or is unstable. There is an error in the wiring resistance (in the case of a 3-wire RTD).	Match the thickness and length of the three wires.	2.4
The measurement error is large or is unstable. Noise effects.	Take measures against noise.	2.10
The measurement error is large or is unstable. Effects from the signal source resistance.	Reduce the signal source resistance such as by inserting a converter.	-
The temperature error is large or is unstable. Effects from parallel connections.	Stop parallel connections. Do not use the burnout setting.	-
Measured value from strain gauge type sensor not correct.	When using a sensor without a remote sensing wire, use the DV450-001 (conversion cable).	-
On the strain module (-B12, -B35), the gauge method and dip switch settings are not correct.	Enter the correct settings.	2.4
On the strain module (-B12, -B35), the gauge resistance and internal bridge resistance values are different	Use a module that supports the resistance value of the strain gauge (120 Ω, -B12; for 350 Ω, -B35).	2.4
On the strain module, scaling corresponding to the gauge method is not set (for 2 gauge and 4 gauge methods, the amount of strain is doubled or quadrupled.)	Displayed with 1 gauge method conversion. Set scaling appropriately depending on the gauge method.	1.7
On the strain module (-NDI), a strain gauge type sensor without a remote sensing wire is being used.	When using a sensor without a remote sensing wire, use the DV450-001 (conversion cable).	2.4

Alarms are not output.

Possible Problem	Corrective Action	Ref. section
There is a problem in the alarm setting.	Both the alarm and output relay must be set appropriately. Make the alarm and output relay settings appropriate.	3.7, 3.8

The CF card is not detected.

Possible Problem	Corrective Action	Ref. section
There is a problem with the CF card.	Replace the CF card. Eject and format the CF card, then insert it again.	2.11

4.4 Calibration

To maintain measuring accuracy, we recommend calibration once per year. Calibration of the instrument requires a calibration instrument of the necessary accuracy and resolution. Please consult with the dealer from whom you purchased the instrument.

Range Calibration for DC Voltage, RTD, Resistance, Strain, and Analog Output

Required Instruments

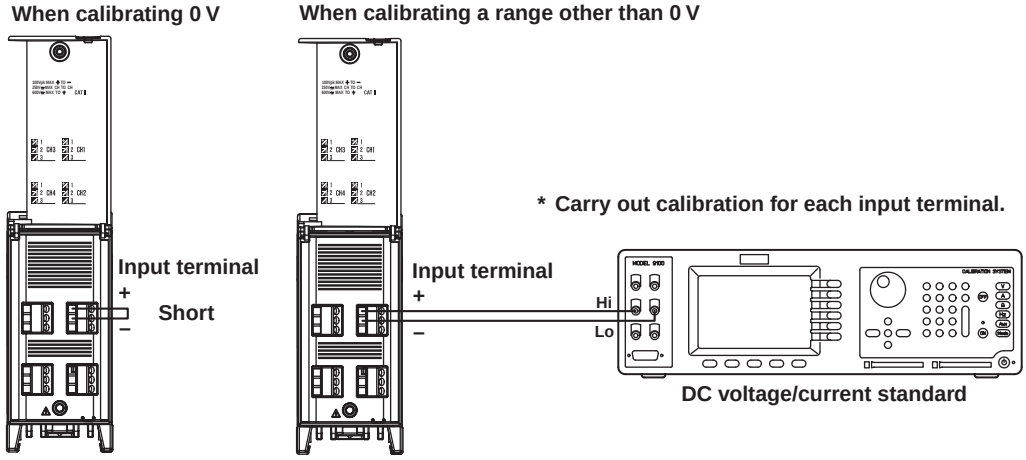
- DC Voltage/Current Standard
  Must meet the following specifications (M/9100 by FLUKE or equivalent)
  Output range: 20 mV to 100 V
  Output accuracy of output range: ±(0.01%+1μV) or less
- Resistance standard
  Must meet the following specifications (ADR3204 by Alpha Electronics or equivalent)
  Resistance setting range: 0.1 to 3000 Ω
  Resistance accuracy of resistance setting range: ±(0.01%+2mΩ) or less
  Resolution: 0.001 Ω
- Bridge head (Yokogawa Electric 319300)
- Digital multimeter
  Must meet the following specifications (7562 by Yokogawa or equivalent)
  Accuracy: ±0.01% or less

Calibration Procedure

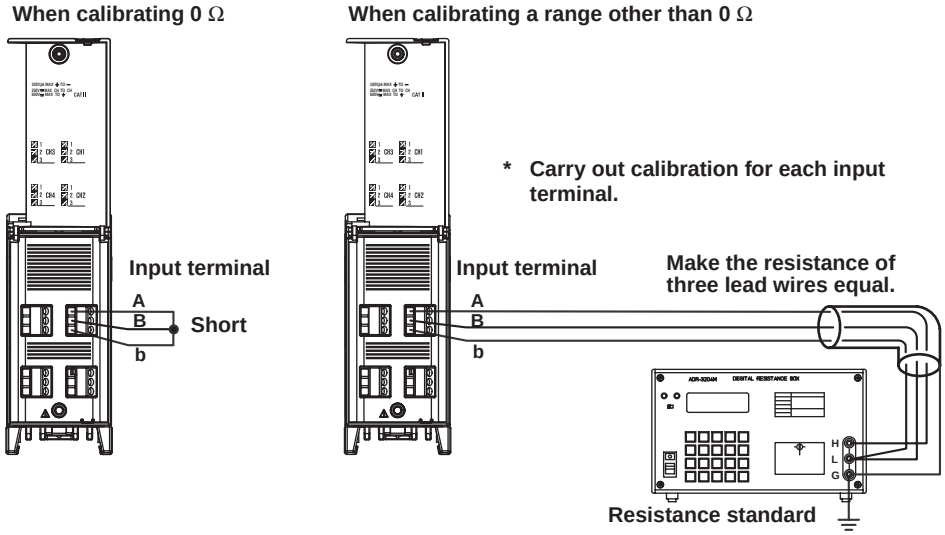
1. Wire the standard and instrument to be calibrated as shown in the figure below.
2. Turn ON the power while holding down user function key 1 on the MW100. The unit enters Calibration mode.
3. Allow a sufficient warm-up time for the MW100 Data Acquisition Unit (thirty minutes or more).
4. Confirm that the ambient temperature and humidity meet the standard operating conditions.
5. After setting up communications between the PC and the MW100, start the MW100 Calibration software and perform calibration.
   For instructions on the calibration software, see the MW100 Viewer Software User's Manual (IM MW180-01E).
6. To exit Calibration mode, turn the power OFF.

Wiring Diagram

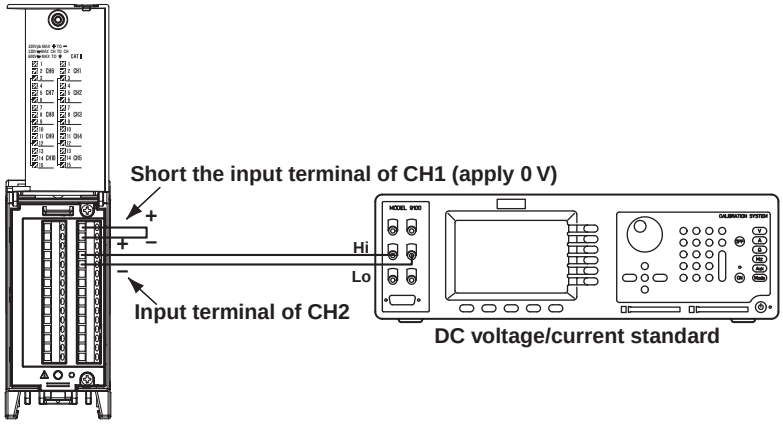
- When calibrating the DC voltage range of the 4-CH, High-Speed Universal Input module



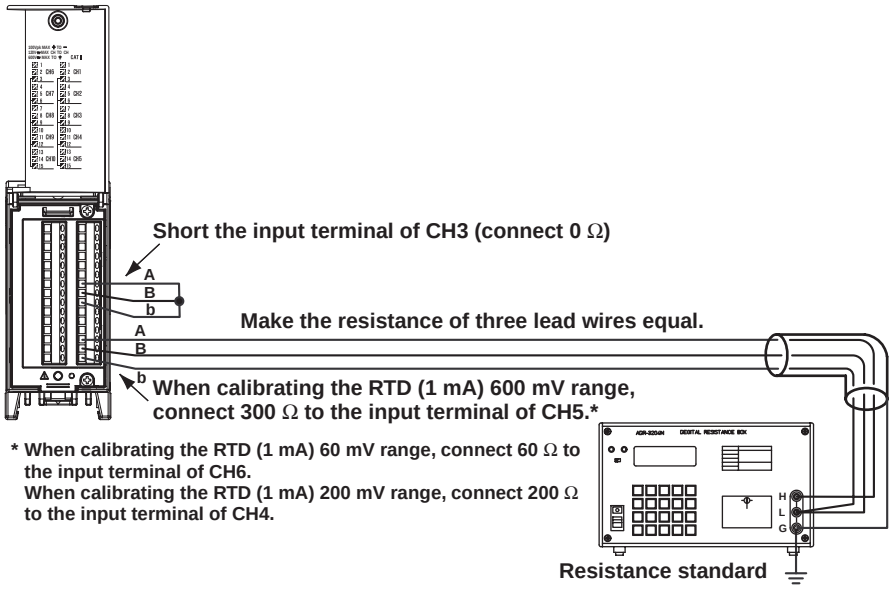
- When calibrating the RTD range of the 4-CH, High-Speed Universal Input module



- When calibrating the DC voltage range of the 10-CH, Medium-Speed Universal Input module

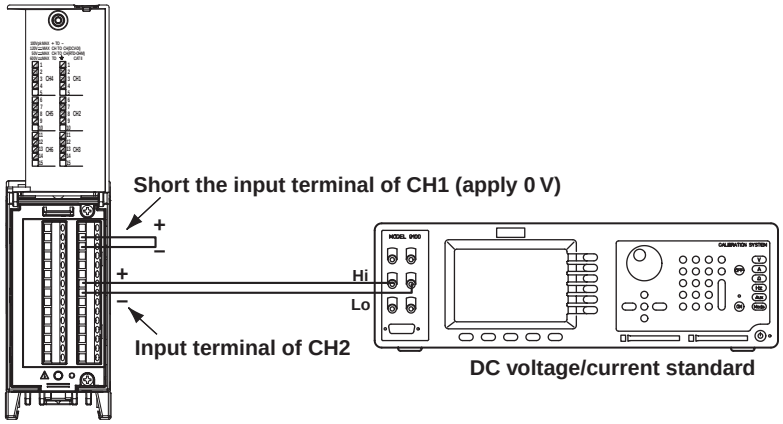


- When calibrating the RTD range of the 10-CH, Medium-Speed Universal Input module

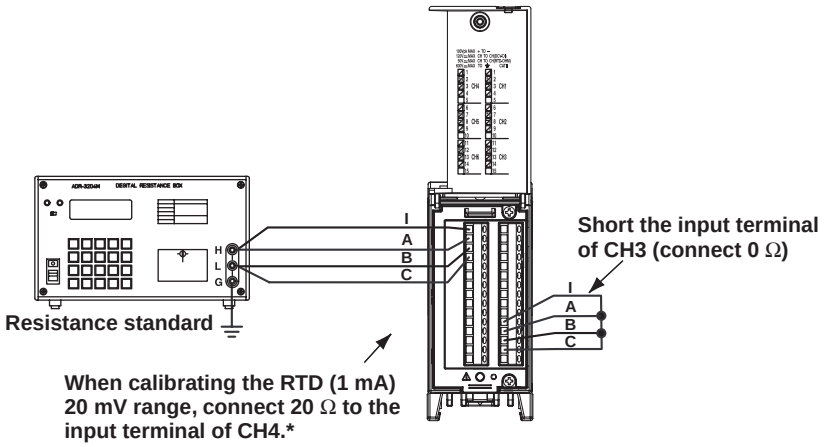


*** When calibrating the RTD (1 mA) 60 mV range, connect 60 Ω to the input terminal of CH6.**
When calibrating the RTD (1 mA) 200 mV range, connect 200 Ω to the input terminal of CH4.

- When calibrating the DC voltage range of the 6-CH, Medium-Speed Four-Wire RTD Input module



- When calibrating the RTD or resistance range of the 6-CH, Medium-Speed Four-Wire RTD Resistance Input module



*** When calibrating the RTD (1 mA) 60 mV range, connect 60 Ω to the input terminal of CH5.**
When calibrating the RTD (1 mA) 200 mV range, connect 200 Ω to the input terminal of CH6.
When calibrating the RTD (1 mA) 600 mV range, connect 300 Ω to the input terminal of CH4.
When calibrating the RTD (0.25 mA) 600 mV range, connect 2400 Ω to the input terminal of CH5.
When calibrating the RTD (0.25 mA) 1 V range, connect 3000 Ω to the input terminal of CH6.

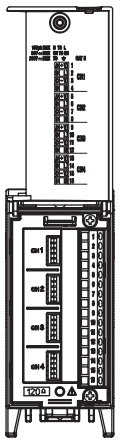
- When calibrating the range of the 4-CH, Medium-Speed Strain Module (-B12, -B35, and -NDI)

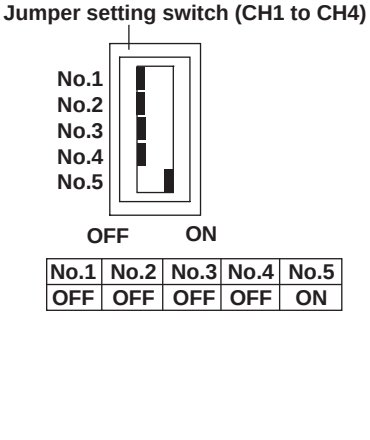
  The clamp terminal (-B12, -B35) and NDIS terminal (-NDI) are connected with the 4-gauge method (see next page). Use a resistance of 120 Ω for resistors R1 through R3, and connect a resistance to R4 equivalent to the Zero or Full value.
  To correctly calibrate the range, do so in the order Zero, then Full.

Calibration range	ZERO Resistors R4	FULL Resistor R4	Resistance value accuracy
ZERO	120.000 Ω	120.000 Ω	±0.005%, ±0.3 ppm/°C
2000 μSTR	120.000 Ω	117.154 Ω	±0.005%, ±0.3 ppm/°C
20000 μSTR	120.000 Ω	113.010 Ω	±0.005%, ±0.3 ppm/°C
200000 μSTR	120.000 Ω	80.000 Ω	±0.005%, ±0.3 ppm/°C

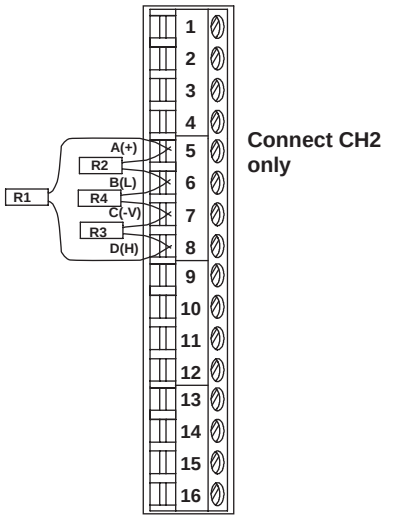
* The Full calibration value of the 2000 μStrain range is equivalent to 12000 μStrain
The Full calibration value of the 20000 μStrain range is equivalent to 30000 μStrain
The Full calibration value of the 200000 μStrain range is equivalent to 200000 μStrain

For -B12, -B35

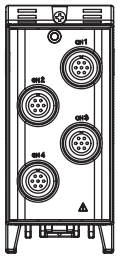


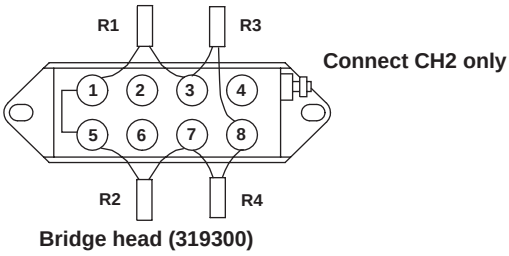


No.1	No.2	No.3	No.4	No.5
OFF	OFF	OFF	OFF	ON

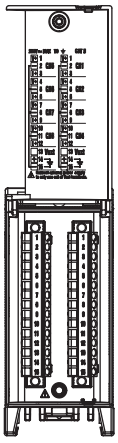


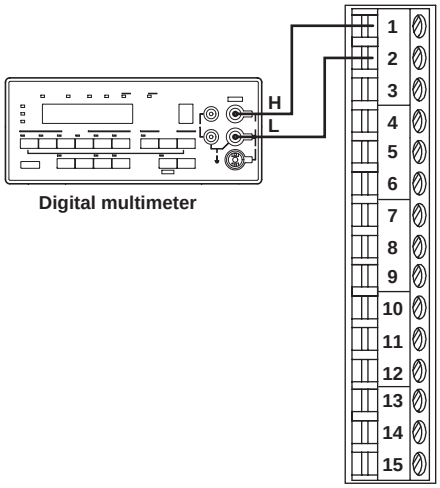
For -NDI





- When calibrating the output range of the 8-CH, Medium-Speed Analog Output module
  All eight channels are calibrated at Zero (0 V) and Full (10 V).





Calibration of Temperature Measurements using Thermocouples

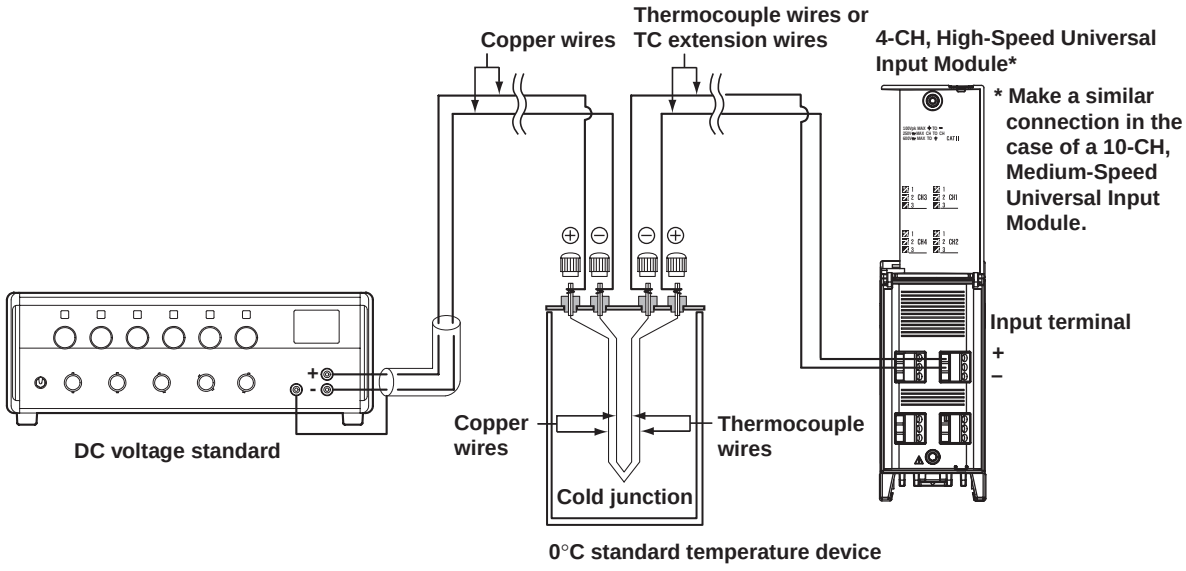
Required Instruments

- DC Voltage/Current Standard
  Must meet the following specifications (5520A by FLUKE or equivalent):
  Output accuracy: ±(0.005%+1μV) or less
- 0 °C reference temperature device
  Must meet the following specifications (ZC-114/ZA-10 by Coper Electronics or equivalent)
  Standard temperature stability accuracy: ±0.05 °C or less

Reference Junction Compensation of Thermocouple Input

Normally, the input terminal of the universal input module is nearly at room temperature, so the actual thermocouple output differs from the value in the table for the thermoelectromotive force of the 0°C standard. The universal input module measures the temperature of the input terminal and compensates by applying a corresponding thermoelectromotive force to the actual thermocouple output. Therefore, when the measurement terminal is shorted (equivalent to the case when the detector tip is 0°C), the measured value indicates the temperature of the input terminal.
When calibrating the universal input module, this compensation voltage (thermoelectromotive force of the 0°C standard corresponding to the input terminal temperature) must be subtracted from the output of the standard generator before application. As shown in the figure, by using the 0°C standard temperature device to compensate the reference junction at 0°C, you can input the 0°C thermoelectromotive force from the DC voltage standard and perform the calibration.

Wiring Diagram



Note

- Calibration of temperature measurements of the MW100 Data Acquisition Unit using thermocouples differs from calibration of DC voltage and RTD ranges in that the input cannot be adjusted. If the temperature measurement calibration using thermocouples does not meet the accuracy specifications, check thoroughly for input error and other problems, then contact your Yokogawa dealer or representative.
- If errors exist in the thermocouple wires and TC extension wires, correct calibration is not possible. Be sure to use a calibrated thermocouple.

4.5 Parts and Maintenance

This instrument does not have parts that need periodic replacement.
However the main module (model: MW100) has wearable parts listed below. Also, the aluminum electrolytic capacitors below are included with each input/output module.
There is no replacement service for the parts listed.
If you are to use the MW100 for an extended time, repair or replace the main module according to the service life of the parts and taking into consideration the actual usage conditions.

Part Name	Lifespan	Remarks
Lithium battery	Approx. 10 years	When used under standard operating conditions. One battery is used.
Aluminum electrolytic capacitor	Approx. 10 years	When used under standard operating conditions.

The main module and PWM output module have fuses. These fuses cannot be replaced by the user. If the fuse blows, contact your nearest YOKOGAWA dealer for repairs.

Installed Module	Rating
Main module AC power supply	Maximum rated voltage: 250 V; maximum rated current: 3.15 A Type: Timelag (T)
Main module DC power supply	Maximum rated voltage: 250 V; maximum rated current: 6.3 A Type: Timelag (T)
PWM module	Maximum rated voltage: 250 V; maximum rated current: 3.15 A Type: Timelag (T)

4.6 System Initialization

Perform this procedure to initialize the settings on the MW100. The following types of initialization are available.

Initialization Type

Type	Level	Items Initialized
Initialization using dip switches	----	All settings
Initialization using communication commands	0	Setting other than configurated module information
	1	Setting other than the following item; IP address, host name, subnet mask, default gateway, baud rate, parity bit, stop bit, data length, handshake and configurated module infomation.

Initialization Procedure

Using Dip Switches

1. Turn OFF the power to the MW100.
2. Check that the switch 5 of dip switch 1 on the main module is OFF.
3. Turn OFF the power to the MW100.
   After the 7-segment LED indicates the power ON self check, bF is displayed.
4. Check the status of step 3, then turn the power OFF.
5. Turn switch 5 of dip switch 1 ON.

Initialization using communication commands

Using a Browser

For information about initialization using communication command, see the MW100 Communication Command manual (IM MW100-17E).

1. From the top screen, click **System Settings** > **Module Information** under the **Top** item.
2. Select the initialization level from the **Initialization Level** box under System information.
3. Click the **Initialize** button. Initialization is performed.

For information on the initialization operating screens, see section 3.3, “System Settings.”

5.1 Common Specifications

Normal Operating Conditions

Rated power supply voltage:	AC power supply (with or without AC adapter): 100 to 240 VAC DC power supply: 12 to 28 VDC
Supply voltage range used:	AC power supply (with or without AC adapter): 100 to 250 VAC DC power supply: 10 to 32 VDC
Power supply frequency:	50 Hz ±2%, 60 Hz ±2%
Power consumption:	AC power, or DC power with AC adapter: Approx. 70 VA max. DC power supply: Approx. 35 VA max. * When any six I/O modules are installed
Vibration:	10 to 60 Hz 0.2m/s^2 or less
Shock:	Not allowed
Magnetic field:	400 A/m or less (50/60 Hz)
Position:	Position horizontally with feet down
Structure:	Not explosion-proof
Usage location:	Indoors
Operating altitude:	2,000 m or less
Overvoltage category:	II (per IEC61010-1 CSA22.2 No. 61010-1)
Measurement category:	II (per IEC61010-1 CSA22.2 No. 61010-1)
Pollution degree:	2 (per IEC61010-1 CSA22.2 No. 61010-1)

Transport and Storage Conditions

Environmental conditions during transport and storage:

Ambient storage temperature :	–25 to 70°C
Ambient storage humidity:	5% to 95% RH (no condensation)
Vibration:	10 to 60 Hz 4.9m/s^2 or less
Shock:	392 m/s^2 or less (packaged condition)

Mechanical Specifications (Excluding AC Adapter)

External dimensions:	Approx. 455 × 131 × 159 mm (when six slots are attached)
Weight:	Approx. 4.3 kg (maximum total weight)
Installation method:	Desktop or floor, panel mount, or attached to a DIN rail
Material:	Steel plate, aluminum die-cast, molded plastic resin

Standards Compliance

CSA:	CSA22.2 No 61010-1, overvoltage category II, measurement category II, pollution degree 2
UL:	Conforms to UL61010B-1 (CSA NRTL/C)
CE:	EMC directive; EN61326 EN61000-3-2 EN61000-3-3 Low voltage directive; EN61010-1; overvoltage category II, measurement category II, pollution degree 2
C-Tick:	Conforms with AS/NZS CISPR11 Class A Group1
Overvoltage category II:	An index for defining transient overvoltages (includes the rated impulse withstand voltage, and applies to electrical equipment supplied with power from fixed installations such as a distribution board).
Pollution degree 2:	The degree of adherence by a solid, liquid, or vapor that reduces the withstand voltage or surface resistance factor (applies only to normal indoor atmospheres (with non-conductive pollution).
Measurement category II:	For measurements performed on circuits directly connected to the electrical distribution system such as provided by a wall outlet.

5.2 Main Module Specifications

Measurement

Style number: S2

Measurement range and accuracy:
See the measurement range and accuracy given in the specifications of each input module.

Maximum number of inputs:
60 inputs (however, only up to six modules can be controlled)

Measurement interval: Select from 10, 50, 100, 200, 500 ms, 1, 2, 5, 10, 20, 30, or 60 s.
Up to three intervals defined for the input modules can be set (multi-interval)
Also, the following limitations apply to the measurement interval and number of measurement channels.

Measurement Interval	Number of measurable channels
10 ms	10
10 ms and 50 ms mixed.	10
50 ms	30

Synchronization between modules:
Synchronized within the same sampling interval (in the same unit)

Synchronization between channels:
4-CH, High-Speed Universal Module and Digital Input Module: Synchronized between channels
10-CH, Medium-Speed Universal Input Module, Six-Channel Medium-Speed Four-Wire RTD Resistance Input Module, and the 4-CH, High-Speed Digital Input Module: Due to the scanner type, not synchronized between channels

Filter function: First-Order Lag Filter
Applicable measurement types: For each channel of DC voltage, thermocouple, RTD, strain, and resistance, you can select a time constant (time until 63.2% of the output value is reached) corresponding to the sampling interval indicated in the table below.
Time constant = measurement interval × N (where N = 5, 10, 20, 25, 40, 50, or 100)

Measurement Interval (s)	Selectable Time Constants (s)						
	N=5	N=10	N=20	N=25	N=40	N=50	N=100
0.01	0.05	0.1	0.2	0.25	0.4	0.5	1
0.05	0.25	0.5	1	1.25	2	2.5	5
0.1	0.5	1	2	2.5	4	5	10
0.2	1	2	4	5	8	10	20
0.5	2.5	5	10	12.5	20	25	50
1	5	10	20	25	40	50	100
2	10	20	40	50	80	100	200
5	25	50	100	125	200	250	500
10	50	100	200	250	400	500	1000
20	100	200	400	500	800	1000	2000
30	150	300	600	750	1200	1500	3000
60	300	600	1200	1500	2400	3000	6000

MATH

Differential computation between channels:
Differential computation between arbitrary channels (DCV, TC, RTD, DI, strain, resistance)

Linear scaling:
Scalable ranges: DCV, TC, RTD, DI, strain, resistance
Scaling range: –30000 to 30000
Scaling display range: –32000 to 32000
Decimal point position: Arbitrary
Units: Can be arbitrarily set using up to six characters

MATH Function Specifications (/M1 Option)

The following MATH functions can be added with options.

Number of MATH channels: 60 (can also be used for communication input)
Number of channels for communication input: 240

Computation start/stop: Execution of computation starts and stops according to user commands (Start/Stop key, Event/Action function, or communication commands).

Reset/clear computed values: Executes resetting/clearing of the computed values according to the Event/Action function, or requests via communication commands or monitor settings.

Group reset: Only the MATH channels set by group, up to seven groups, are reset by the Event/Action function. Can be executed using the Event/Action function.

Calculations:
Basic math (+, –, ×, ÷, exponentiation)
Relational operators (>, ≥, =, ≤, <, ≠)
Logical operators (AND, OR, XOR, NOT)
Arithmetic operators (SQR, ABS, LOG, EXP)
TLOG computations (max, min, max-min, average, integration, pulse integration)
CLOG computations (max, min, max-min, average)
Conditional expressions ([EXPR1?EXPR2:EXPR3])

MATH reference channels:
Measurement channel
MATH channels*
Communication input channels
Flag input channels
MATH constant
Program channels
* If an expression refers to its own channel or a channel of a larger number than its own channel, the data from the previous MATH interval is used.

MATH interval: Specify one from among the measurement group numbers, and perform computation. However, measurement intervals of 10 ms or 50 ms cannot be specified.

Characters used in expressions:
Up to 120 per channel
For communication input channels only, a maximum of 8 characters can be used per channel.

Number of stacks: 35 or fewer per expression

Conditional expression:
Other expressions can be nested in conditional expressions.
Conditional expressions can be nested together.
Operators cannot be used to combine conditional expressions.

MATH span:
When displaying waveforms on the Web, set the upper and lower limit values.
The setting range is –9,999,999 to 99,999,999.

Decimal place setting: 0 to 4

Computation range: A given result during computation must be within $\pm 3.4 \times 10^{38}$.

Math output value: Data output by the computation (for binary output)

Data Type	Description
–9,999,999-99,999,999	Normal output range
2,147,450,879 (7FFF7FFFh)	Plus over
–2,147,385,343 (80018001h)	Minus over
–2,147,319,806 (80028002h)	Skip

* If the computation fails, the previous value is output.

MATH constants: 60
Precision: Mantissa, 5 digits; exponent, 2 digits
Range: –9.9999E+29 to –1.0000E-30,0,1.0000E-30 to 9.9999E+29

Communication input channels: 300
Numerical values in expressions can be substituted using communication input.
Precision: Mantissa, 5 digits; exponent, 2 digits
Range: –9.9999E+29 to –1.0000E-30,0,1.0000E-30 to 9.9999E+29

Flag input channels: 60
Flag value can be substituted in computational expressions.
Range: 0, 1
Varies according to the operation of the Event/Action function.

Program channels: 3
Broken line data can be input into expressions.
Setting is possible of up to 32 points of the time from the start point and the output value at that point. Straight lines can link those specified points, and the values at each elapsed time are output.
No. of set points: 32
Elapsed time from start point: 0 to 86400 sec.
Start point time: Fixed at 0
Limitation on specification of elapsed time: Only 1 output value per specified time allowed
Output values: –30000 to 30000

MATH alarm function: Four levels per channel
Type: Upper limit and lower limit only. No hysteresis function available.

Loss of computed data: In the monitor screen, when the MATH performance meter exceeds 100%, some computations at each MATH interval cannot be completed, and loss of computed data occurs. When this happens, the previous computed value is held. If computation loss occurs frequently, lengthen the MATH interval to reduce the load. To stop computation promptly, press the Stop key on the main module.

When the volume of computations is high:
Display updating on the monitor screen, response to computation stop operations, and other behavior may be slow. To stop computation promptly, press the Stop key on the main module.

Operation after power failure:

If a power failure occurs during a computation, the value computed just before the power failure is recalled after recovery, and computation starts using that value.

Type	Value after power failure recovery
MATH channel data	Holds previous value
Communication input channel data	Holds previous value
Flag input channel data	Holds previous value
Program channel data	Holds elapsed time and previous value

Remote RJC

When the item to be measured is located at a great distance, you can setup relay terminals near the item, measure between the relay terminal and the input terminal of the universal input module (reference channel) using thermocouples, and use the resultant value as the reference junction compensation of the temperature measurement. However, the same thermocouple type is used for reference channels and measured channels.

Alarms

Alarm types: Upper limit, lower limit, differential upper limit, differential lower limit, high limit on rate of change, low limit on rate of change

Number of settings: Four levels per channel
ON/OFF can be set for each channel and level

Alarm setting range: DCV, TC, RTD, DI, strain, resistance, scaling and remote RJC

Hysteresis: Alarm OFF value arbitrarily set

Number of alarm outputs:
10 to 60 outputs (10 points per DO module)

Output mode: Energize/De-energize, AND/OR, Hold/Non-hold

Alarm ACK: If set to hold using the alarm status or relay output Hold/Non-hold, the hold status is cleared.

Alarm update interval: 100 ms (not synchronized with the measurement interval)

Recorder Structure

Measured values, computed values, thinned values, setting values, data acquisition logs, and alarm summaries can be saved to CF card as a recording action.
Folders for each file type are created on the CF card, and files are saved in them.

CONFIG: Folder for storing the setting value file

DATA: DATAnnnn storage folder
The folder management file MWFOLDER.INF is created in the DATA folder. The file contains the latest folder numbers, and should not be deleted. If a DATA folder is deleted, a new folder is created starting with DATA0000.

DATAnnnn: Folder for storing measured values, computed values, thinned values, data acquisition logs, and alarm summaries.
“nnnn” is automatically generated from 0000 to 9999

Recording of Measured/Computed Values

Measured and computed values can be saved by measurement group to the CF card.
Supported external media:
CF card Type II × 1 slot (Type I can be used)
Max. card size: 2 GB

Record start/stop: Starts and stops recording to CF card per the START and STOP keys, Event/Action function, or communication commands.

Recording operation: Separate files created for each measurement group, and measured and computed data is saved to CF card.
For each measurement group, you can select whether or not to perform the save operation.

Measurement groups: Measurement channels can be divided into up to 3 groups by module. The measurement interval must be the same for all channels in the group.

Write mode: Single, Full Stop, Rotate
You can set the recording stop operation by measurement group.
If free space cannot be secured or when securing of free space takes extended time, an error is indicated on the 7-segment LED.
For details, see chapter 4.1, “Media Related Errors.”

Triggers: Direct, Trigger
You can set the recording start action by measurement group.

Pretrigger function: The pretrigger when write start is triggered can be set for each measurement group from 0 to 100% in 10% intervals.

Pretrigger length: When there are fewer than ten data, the pretrigger length is rounded up.
When there are ten or more data, the pretrigger length is rounded down.

Ex.) Recording interval 600 second, data length 1 hour, pritrigger 30 %
Number of data in a file: 1 hour / 600 sec = 6
Pritrigger length = 6 × 30 / 100 = 1.8 about 2 files
Posttriger length = 6 - 2 = 4

Recording channels: You can specify, common to all measurement groups, whether to record on each channel. However, the number of recording channels is limited by the measurement interval as follows:
1500 ch/sec. or less

Ex.) Measurement group 1 Recording interval 10 ms, 10 ch
Measurement group 2 Recording interval 100 ms, 50 ch
(1s / 0.01s) × 10ch + (1s / 0.1s) × 50ch = 1500 ch/sec.

Recording interval: Set the recording interval for each measurement group as a multiple of the measurement interval.
For a measurement interval of 50 ms, 500 ms, or 5 s, set a multiple of 1, 2, 4, or 10. Otherwise, set a multiple of 1, 2, 5, or 10.

File size: Within approximately 10 MB per file

File name: Automatically generated using the date, time, and serial number
MDDIXXXX.MXD

M: Month file created (local time), 1-9, X (October), Y (November), Z (December)
DD: Date when file created (local time), 1-31
I: Files in measurement groups 1 to 3 are 1 to 3
Computed data file is M
Thinned values, T
XXXX: Sequence number 0000-9999
MXD: MW100 file extension (uppercase)

Data length: Measurement groups for which TRIGGER was selected can be set individually.
For the measurement groups on which Direct mode was selected, all groups have the same length.

Trigger Type	Selectable data length	Target
Direct	30 min. 1, 2, 3, 4, 6, 8, or 12 hours 1, 2, 3, 5, 7, 10, 14, or 31 days	All groups
Trigger	10, 20, or 30 min. 1, 2, 3, 4, 6, 8, or 12 hours 1, 2, 3, 5, 7, 10, 14, or 31 days	Individual groups

File size calculation: File size (bytes) = header size* + data size **

* Header size (bytes) = 904 + no. of recording channels × 232

** Measurement data size (bytes) = no. of recording measurement channels × 4 × no. of samples
Math data size (bytes) = no. of recording math channels × 6 × no. of samples
No. of samples = Save interval (s)/measurement interval (s)

Ex.) Measurement interval: 100 ms; no. of measurement channels, 24; save interval, 10 min.:
Header size = 904 (bytes) + 24 × 232 (bytes) = 6472 (bytes)
Data size = 24 (bytes) × (600 (s)/0.1 (s)) = 576,000 (bytes)

Guideline of the sample time for the different CF card sizes (when one type of measurement interval is used):

Number of Saved CHs	Measurement Interval	Capacity of the CF card		
		128MB	512MB	1GB
10 CHs	10 ms	8.8 hours	35.3 hours	2.8 days
	100 ms	3.7 days	14.8 days	28.9 days
	500 ms	18.5 days	74 days	144 days
	1 s	37 days	148 days	289 days
	2 s	74 days	296 days	578 days
24 CHs	100 ms	36.8 hours	6.1 days	12.0 days
	500 ms	7.7 days	30 days	60 days
	1 s	15.3 days	61 days	119 days
	2 s	30 days	122 days	239 days
60 CHs	100 ms	14.8 hours	2.4 days	4.8 days
	500 ms	3.0 days	12.3 days	24.1 days
	1 s	6.1 days	24.6 days	48 days
	2 s	12.3 days	49 days	96 days
	5 s	31 days	123 days	241 days

Write message: During execution of the recording action, a message that corresponds to the recorded data can be included in the file.
No. of characters in message: Up to 15
Messages: 5
No. of write operations: Up to 10 per file

Operation upon failure recovery:
If a power failure occurs during recording, the data up to the failure is restored upon recovery from the failure. The data after recovery is recorded continuously to newly created files.

Operation when synchronizing time:
If time synchronization to SNTP is carried out during recording, the time is saved to the data acquisition log file.

Thinning Recording Function

Apart from the measured and computed values file, a set of thinned values from the measured and computed values are saved to CF card.

Record start/stop: Executed simultaneously upon recording of the measured values and computed values. No trigger functions are available.

Recording operation: User can select Thinning record or Do not record

Record mode: Select a record stop action of Single, Full stop, or Rotate.

Thinning time: Data saving is set for 1 per thinning time.
Set a thinning time of: 4, 5, 10, 20, or 30 sec; 1, 2, 3, 4, 5, 10, 20, or 30 min.; or 1 hour. However, the thinning time cannot be set shorter than the measurement interval.

File name: Generated automatically in sequence using the date and time (cannot be specified by the user).

Data length: Select 30 minutes, or 1, 2, 3, 4, 6, 8, or 12 hours, or 1, 2, 3, 5, 7, 10, 14, or 31 days. However, it cannot be set so that the file size could exceed 10 MB. Also, the data length cannot be set shorter than the thinning time.

Recording channels: Can be specified for each channel (settings for recording of measured and computed values is set separately)

File size: The file size equation is the same as that for the computed value files.

Writing message: During execution of the recording action, a message that corresponds to the recorded data can be included in the file. Five messages of up to 15 characters each are available for including in a single file, up to 10 messages per file.

Operation upon failure recovery:
If a power failure occurs during recording, the data up to the failure is restored after appended during recovery from the failure. The data after recovery is recorded continuously to newly created files.

Internal Backup Memory

Function overview: Using the main unit's internal backup memory (SRAM) even upon a power failure, data before the failure is saved to CF card without loss.

Backup memory capacity:		
	For measured and computed values	1.25 MB
	For thinned values	256 KB

Saving Settings

Saves settings to CF card.

Saving/loading: Set by user function key on the main unit or by communication input. From the function keys, only the SETTING.PNL file can be loaded.

Saved settings: All settings are saved

File creation location: CONFIG folder on the CF card

Created file name: From the user function keys, SETTING.PNL.
From communication commands or the browser, a name can be set with the PNL extension.

Display

Status LED: Illuminated: Indicates measuring, recording, alarm occurrence, computing, and receiving data by serial communications
Blinking: Recording or computation in progress

Two-digit 7-segment LED:
MW100 Data Acquisition Unit status display
Unit number, error occurrence time, power ON self-check in progress, key lock ON, processing.

Ethernet port LED: Ethernet communication status (LINK, ACT)

Communication

Ethernet Port

Interface: Ethernet (10BASE-T)

Connector type: RJ-45

Main protocols: FTP, SMTP, SNTP, DHCP, DNS, HTTP, Modbus/TCP, and MW100 dedicated protocol.

Communication services: Send/receive measured and computed values, send/receive setting values, maintenance/diagnostic services, and others.

Login function: Use when accessing a setting/measurement server, maintenance/diagnostic server, FTP server, or Web server. Up to 10 can be registered.

List of services:

Modbus server	Uses Modbus protocol
FTP server	File transfer services
HTTP server	Web services
SNTP server	Time synchronization
GENE server	For communication commands only for MW100
DIAG server	For maintenance diagnostics

Timeout function: Connection to server from which no communication is made over a specified period is forcibly dropped.

Keep alive function: If no response is made to periodically sent test packets on the TCP level, the connection is forcibly closed.

DHCP function: The IP address is automatically obtained from the DHCP server

SNTP function: As the client, this function can acquire time information from the apecified SNTP server when the power is turned on, upon start of measurement, when the SNTP client is turned ON, at a user-specified time, and at a specified time interval.
When time information is acquired upon startup, measurement start, and when the SNTP client is turned ON, the time is not applied if the difference between the time of the MW100 and the server is 1 hour or more. When the time is acquired at specified time intervals, the MW100 time is corrected by 1 second at 10 second intervals. This is effective when the shortest measurement interval within a unit is two seconds or more. However, if the time between the server and MW100 is different by 10 minutes or more, the time is not applied.

E-Mail function: Sends e-mail according to alarm activation/release, specified time intervals, file creation time, time at which free memory space drops below specified amount, time power turned ON, times errors occur, and other times.
Two mail recipient locations can be set (multiple addresses using up to 150 characters).

FTP function: Acting as a client, measured values, computed values, thinned value files, data acquisition logs, and alarm summaries in the CF card can be transferred. Up to two recipients, a primary and secondary recipient, can be specified (using up to 64 characters). The file is sent upon creation of the file. The files are sent to the primary recipient first, and if transmission fails, they are sent to the secondary recipient. If transmission to the secondary recipient also fails, the file is held in memory (up to eighteen files that failed to be sent are held) and transmission is retried after the next file is created or when the power is turned on (assuming there are files in the CF card). If transmission fails more than eighteen times, old files are overwritten with new ones.
When acting as the server, the MW can transfer or delete files according to commands from a PC.

HTTP function: Enables entry of settings on the MW100, starting and stopping of measurement, computation, and recording, and real time monitoring of measured and computed values using a Web browser, as well as acquisition of CF card files using WebDAV.

RS-232 Interface (/C2 Option)

Connection method: Point-to-point
Communications: Half-duplex
Synchronization: Start-stop synchronization
Baud rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bits
Start bit: 1 bit, fixed
Data length: Select either 7 or 8 bits
Parity: Select Odd, Even, or None
Stop bit: Select either 1 or 2 bits
Hardware handshaking: RS-CS can be used
Software handshaking: X-ON, X-OFF can be used
Receive buffer length: 2047Byte
Protocol: Dedicated protocol and Modbus/RTU
Communication services: Send/receive setting values, send/receive measured and computed values.

RS-422A/485 Interface (/C3 Option)

Connection method: Multi-drop: 4-wire 1: 32, 2-wire 1: 31
Communications: Half-duplex
Synchronization: Start-stop synchronization
Baud rate: Select 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps
Start bit: 1 bit, fixed
Data length: Select either 7 or 8 bits
Parity: Select Odd, Even, or None
Stop bit: Select either 1 or 2 bits
Receive buffer length: 2047Byte
Protocol: Dedicated protocol and Modbus/RTU
Communication services: Send/receive setting values, send/receive measured and computed values.

Communication Input Function

All settings on the main unit other than dip switch operation can be performed with communication commands. For information about communication commands, see the MW100 Communication Command manual (IM MW100-17E).

Communication Output Function

The following information about the main unit can be output using communication commands. For information about communication commands, see the MW100 Communication Command manual (IM MW100-17E).

Item	Description
Measured value	Outputs most recent measured value
Computed value	Outputs most recent computed value
Output value	Outputs most recent output value
Units, decimal place	Outputs the units and decimal place for measured and computed values
Measured and computed value FIFO data	Outputs the measured and computed values from the FIFO buffer
Thinned values FIFO data	Outputs the thinned values from the FIFO buffer
Alarm summary	Outputs the alarm summary
Message summary	Outputs the message summary
Data acquisition log	Outputs the data acquisition log
Computation status	Outputs the MATH status
Recording status	Outputs the recording status
Operation log	Outputs the key operation log
Communication log	Outputs the communication log
FTP log	Outputs the FTP operation log
SMTP client log	Outputs the mail transmission log
DHCP log	Outputs the DHCP log
HTTP log	Outputs the HTTP log
Modbus client log	Outputs the Modbus client log
Modbus client command	Outputs the Modbus client status
Modbus client connection status	Outputs the Modbus client connection status
Modbus master log	Outputs the Modbus master log
Modbus master command	Outputs the Modbus client status
Modbus master connection status	Outputs the Modbus master connection status
Status	Status byte information
User information	User settings
Relay information	Relay action information
System information	Outputs the module recognition status
Analog output information	Outputs the analog output value information
Initial balancing information	Outputs initial balance information for the strain input module

Common to Modbus Master Function and Modbus Slave Function

Communication possible with Modbus/RTU protocol
Communication media: RS-232, RS-422A/485
Control method: No flow control (None only)
Baud rate: Select 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 bps
Start bit: 1 bit, fixed
Data length: 8 bit, fixed
Parity: Select Odd, Even, or None
Stop bit: Select either 1 or 2 bits
Transmission mode: RTU (remote terminal unit) mode only
Slave address: 1 to 247

Modbus Master Function (/M1 option)

Communication interval: The interval for data loading from other instruments is selected from the following.
100, 200, 250, 500 ms, or 1, 2, 5, or 10 s

Timeout time: From the following, select a timeout time for no response from the specified slave after sending commands from the main unit.
100, 200, 250, 500 ms, or 1 s

Number of retries: The number of transmissions attempted if no response to commands from the main unit are received from the slaves.
Select from the following: OFF, 1, 2, 3, 4, or 5

Communication recovery time: You can select from the following the send interval for the command sent after the point at which there is no response from the slaves after sending commands the specified number of retry times.
Soon (communication interval), 1 to 120 s

Wait between commands: Select a time to wait between receiving of the response to a command until the next command is sent.
0, 10, 20, 50, 100 ms

Supported function: The functions that the MW100 supports are as follows.

Function Code	Function	Operation
3	Read hold registers (4XXXX, 4XXXXX)	MW100 loads data from the hold registers of another instrument to its communication input channel data.
4	Read input registers (3XXXX, 3XXXXX)	MW100 writes data from the input register of another instrument to its communication input channel data.
6	Simple write to hold registers (4XXXX, 4XXXXX)	MW100 writes to the hold register of another instrument.
16	Write to hold registers (4XXXX ,4XXXXX)	MW100 writes to the hold register of another instrument

Command settings: Up to 100 commands can be set.

Command items:

Loading channels:	C001 toC300
Writing channels:	001 to 060, A001 to A300, C001 to C300
Address:	1 to 247
Input registers:	30001 to 39999, 300001 to 365535
Hold registers:	40001 to 49999, 400001 to 465535
Type:	

Type	Description
INT16	Signed 16-bit integer
UINT16	Unsigned 16-bit integer
INT32_B	Signed 32-bit integer (from upper to lower.)
INT32_L	Signed 32-bit integer (from lower to upper.)
UINT32_B	Unsigned 32-bit integer (from upper to lower.)
UINT32_L	Unsigned 32-bit integer (from lower to upper)
FLOAT_B	32-bit floating decimal (from upper to lower.)
FLOAT_L	32-bit floating decimal (from lower to upper)

Modbus Slave Function

Supported function: The functions that the MW100 supports are as follows.

Function Code	Function	Operation
3	Read hold registers (4XXXX)	MW100 read communication input data 16 written by function code 6 or 16
4	Read Input registers (3XXXX)	MW100 reads the main instrument's measured, computed, and time data.
6	Simple write to hold registers (4XXXX)	MW100 writes to the main instrumentls communication input data.
8	Loop back test	MW100 performs the loop back test on the main instrument. Main instrument only support message return (diagnostic code (0x00).
16	Write to hold registers (4XXXX)	MW100 writes to the main instrument's communication input data.

Register Assign (Modbus Server Functions and Sharing)

Input Registers	Data	Data Type
30001	Lower byte of measured data of measurement channel 001	Int 32
30002	Upper byte of measured data of measurement channel 001	
|	|	
30119	Lower byte of measured data from measurement channel 060	
30120	Upper byte of measured data from measurement channel 060	
• No decimal place information.		
31001	Lower byte of measured data from measurement channel 001	Float
31002	Upper byte of measured data from measurement channel 001	
|	|	
31119	Lower byte of measured data from measurement channel 060	
31120	Upper byte of measured data from measurement channel 060	
• Includes decimal place information.		
32001	Alarm status of measured data of measurement channel 001	Bit string
|	|	
32060	Alarm status of measured data of measurement channel 060	
• Register structure and alarm status values **Alarm** **2** **1** **4** **3** **4 bits** **4 bits** **4 bits** **4 bits** 0: No alarms 1: Upper limit alarm occurs 2: Lower limit alarm occurs 3: Differential upper limit alarm occurs 4: Differential lower limit alarm occurs 5: Rate of change upper limit alarm occurs 6: Rate of change lower limit alarm occurs		
33001	Lower byte of computed data of computation channel A001	Int 32
33002	Upper byte of computed data of computation channel A001	
|	|	
33599	Lower byte of computed data of computation channel A300	
33600	Upper byte of computed data of computation channel A300	
• No decimal place information.		
34001	Lower byte of computed data of computation channel A001	Float
34002	Upper byte of computed data of computation channel A001	
|	|	
34599	Lower byte of computed data of computation channel A300	
34600	Upper byte of computed data of computation channel A300	
• Includes decimal place information.		
35001	Alarm status of computed data of computation channel A001	Bit string
|	|	
35300	Alarm status of computed data of computation channel A300	
• Register structure and alarm status value: Same as alarm status of measured data.		

Input Registers	Data	Data Type
39001	Year	Int 16
39002	Month	
39003	Day	
39004	Hours	
39005	Minute	
39006	Second	
39007	Milliseconds	
39008	DST(0, 1)	

Hold Registers	Data	Data Type
40001	Lower byte of communication input channel C001	Float
40002	Upper byte of communication input channel C001	
|	|	
40599	Lower byte of communication input channel C300	
40600	Upper byte of communication input channel C300	

Modbus error response: The main unit returns the following error codes to the master instrument.

Code	Function	Operation
1	Function code invalid	Requested non-supported function
2	Invalid register number	Attempted to read/write registers for which no corresponding channels could be found.
3	Invalid number of registers	The specified number of registers was zero.
7	Could not be executed	Attempted to read MATH registers from an instrument without the MATH function option.

However, there is no response in the following cases.
- CRC Error
- Errors other than in above table.

Modbus Client Function (/M1 option)

Communication possible with Modbus/TCP protocol

Communication media: Ethernet 10Base-T

Communication interval: You can select the following:
100, 200, 250, or 500 ms, or 1, 2, 5, or 10 s
Depending on the performance of the main unit, data reading and writing may not be able to be performed at the set communication interval resulting in data loss. If this occurs, the communication input channel holds the previous value. In this case, you must lengthen the communication interval, or reduce the load on the main unit.

Connection wait time: The connection can be dropped if there is no response from the server after sending commands.
You can select the connection wait time from the following.
Forever (do not drop connection), 0 to 10 s

Communication recovery wait: The time after which commands are sent following disconnection after the connection wait time. Selected from the following: Soon (communication interval), 1-60 s

Connection destination (server): Up to 10 can be set.

Supported function: Same as Modbus master function

Command settings: Up to 100 commands can be set.

Command items: Loading channels: C001 to C300
Writing channels: 001 to 060, A001 to A300, C001 to C300
Server (specified by registered number): 1 to 10
Input registers: Same as Modbus master function
Hold registers: Same as Modbus master function
Type: Same as Modbus master function

Modbus Server Function

Communication possible with Modbus/TCP protocol

Communication media: Ethernet 10Base-T

Port: 502/tcp

Communication interval: 100, 200, 250, or 500 ms, or 1, 2, 5, or 10 s

Maximum no. of simultaneous connections: 4

Receive timeout: Drops communication connection if packets not received for 30 s (fixed) or more

Supported function: Same as Modbus slave function. However, there is no function code 8.

Register assignments: Same as Modbus slave function

Modbus error response: Same as Modbus slave function

E-Mail Format

In the explanations that follow, *CRLF* means "carriage return/line feed." Alarm Notification E-mail Format

- **Subject**

  `Subject: [Alarm Summary]`

- **Syntax**

  CRLF
  `Alarm_Summary`*CRLF*
  `DATE_yy/mo/dd`*CRLF*
  `TIME_hh:mi:ss`*CRLF*
  CRLF
  `<Alarm Summary>`*CRLF*
  `cc____lq_aaa`*CRLF*
  `••••••••••••••••••••••••••`
  `mmmm_lq_aaa`*CRLF*
  `••••••••••••••••••••••••••`
  CRLF
  `s_cc_uuuuuufdddddEfp`*CRLF*
  `••••••••••••••••••••••••••`
  `s_mmmm_feeeeeeeeEfp`*CRLF*
  `••••••••••••••••••••••••••`
  CRLF

`yy`	Year (`00` to `99`)
`mo`	Month (`01` to `12`)
`dd`	Day (`01` to `31`)
`hh`	Hour (`00` to `23`)
`mi`	Minute (`00` to `59`)
`ss`	Seconds (`00` to `59`)
`cc`	Measurement ch no. (`01` to `60`, SKIP channels not output)
`mmmm`	MATH ch no. (`A001` to `A300`)
`l`	Alarm level (`1` to `4`)
`q`	Alarm type (`H`, `L`, `h`, `l`, `R`, `r`) `H` (upper limit alarm), `L` (lower limit alarm), `h` (differential upper limit alarm), `l` (differential lower limit alarm), `R` (high limit on rate of change alarm), `r` (low limit on rate of change alarm)
`aaa`	Alarm status (`off`, `on`)
`s`	Data status (`N`, `D`, `O`, `E`) `N` (normal), `D` (differential input), `O` (over), `E` (error)
`uuuuuu`	Unit information (output using 6 chars., left justified) `mV____`: mV `V_____`: V `^C____`: °C `XXXXXX`: (user specified char. string)
`f`	Data symbols (+, –)
`ddddd`	Data mantissa (measurement channel, `00000` to `99999`) `–32767` to `+65535`: Normally allowed output range `+99999`: +OVER, ERROR (measurement error occurs), or indefinite `–99999`: –OVER
`eeeeeeee`	Data mantissa (measurement channel, `00000000` to `99999999`) `–99999999` to `+99999999`: Normally allowed output range `+99999999`: +OVER `–99999999`: –OVER
`p`	Exponent (`0` to `4`)
`_`	Blank

File Creation Notification E-mail Format

- **Subject**

  `Subject: [File End]`

- **Syntax**

  CRLF
  `File_End`*CRLF*
  `<Time>`*CRLF*
  `DATE_yy/mo/dd`*CRLF*
  `TIME_hh:mi:ss`*CRLF*
  CRLF
  `<File_Name>`*CRLF*
  `fl/fn`*CRLF*
  CRLF

`yy`	Year (`00` to `99`)
`mo`	Month (`01` to `12`)
`dd`	Day (`01` to `31`)
`hh`	Hour (`00` to `23`)
`mi`	Minute (`00` to `59`)
`ss`	Seconds (`00` to `59`)
`fl`	Folder name
`fn`	File name
`_`	Blank

Media Remaining Space Notification E-mail Format

- **Subject**

  `Subject: [Media Remain]`

- **Syntax**

  CRLF
  `Media_Remain`*CRLF*
  `<Time>`*CRLF*
  `DATE_yy/mo/dd`*CRLF*
  `TIME_hh:mi:ss`*CRLF*
  CRLF
  `<Media_Info>`
  `aaaaaaa_K_byte_total`*CRLF*
  `bbbbbbb_K_byte_free`*CRLF*
  CRLF

`yy`	Year (`00` to `99`)
`mo`	Month (`01` to `12`)
`dd`	Day (`01` to `31`)
`hh`	Hour (`00` to `23`)
`mi`	Minute (`00` to `59`)
`ss`	Seconds (`00` to `59`)
`aaaaaaa`	Media capacity [KB] (`0000000` to `9999999`)
`bbbbbbb`	Media total capacity [KB] (`0000000` to `9999999`)
`_`	Blank

Power ON Notification E-mail Format

- **Subject**

  Subject: [Power Failure]

- **Syntax**

  CRLF
  Power_Failure*CRLF*
  <Power_Off>*CRLF*
  DATE_yy/mo/dd*CRLF*
  TIME_hh:mi:ss*CRLF*
  CRLF
  <Power_On>*CRLF*
  DATE_yy/mo/dd*CRLF*
  TIME_hh:mi:ss*CRLF*
  CRLF

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Seconds (00 to 59)
_	Blank

Error Notification E-mail Format

- **Subject**

  Subject: [ERROR]

- **Syntax**

  CRLF
  ERROR*CRLF*
  <Time>*CRLF*
  DATE_yy/mo/dd*CRLF*
  TIME_hh:mi:ss*CRLF*
  CRLF
  <ERROR_Message>*CRLF*
  nnn_mmmmmmm*CRLF*
  CRLF

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Seconds (00 to 59)
nnn	Error number
mm••mm	Error message
_	Blank

Periodic Report Notification E-mail Format

- **Subject**

  Subject: [Periodic Data]

- **Syntax**

  CRLF
  Periodic_Data*CRLF*
  <Time>*CRLF*
  DATE_yy/mo/dd*CRLF*
  TIME_hh:mi:ss*CRLF*
  CRLF
  <CH_Data>*CRLF*
  s_cc_uuuuuufdddddEfp*CRLF*
  ••••••••••••••••••••••••••
  s_mmmm_feeeeeeeEfp*CRLF*
  ••••••••••••••••••••••••••
  CRLF

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Seconds (00 to 59)
s	Data status (N, D, O, E) N (normal), D (differential input), O (over), E (error)
cc	Measurement ch no. (01 to 60, SKIP channels not output)
mmmm	MATH ch no. (A001 to A300, SKIP channels not output)
uuuuuu	Unit information (output using 6 chars.) mV____: mV V_____: V ^C____: °C xxxxxx: (user specified char. string)
f	Symbols (+, –)
ddddd	Data mantissa (measurement channel, 00000 to 99999)
eeeeeeee	Data mantissa (measurement channel, 00000000 to 99999999)
p	Data exponent (0 to 4)
_	Blank

Test E-mail Format

- **Subject**

  Subject: [Test]

- **Syntax**

  CRLF
  Test*CRLF*
  <Time>*CRLF*
  DATE_yy/mo/dd*CRLF*
  TIME_hh:mi:ss*CRLF*
  CRLF

yy	Year (00 to 99)
mo	Month (01 to 12)
dd	Day (01 to 31)
hh	Hour (00 to 23)
mi	Minute (00 to 59)
ss	Seconds (00 to 59)
_	Blank

Communication Test: This function checks whether the FTP and mail transmission settings are entered correctly.

Notation	Description
FTP1	Transfers a test file to recipient 1.
FTP2	Transfers a test file to recipient 2.
SMTP1	Transfers a test mail to recipient 1.
SMTP2	Transfers a test mail to recipient 2.

User Interface

Number of keys: 4: Start key (START) and Stop key (STOP),
User function key 1 (USER1),
User function key 2 (USER2),

Key action:
- START: Measurement, computation, and recording start
- STOP: Measurement, computation, and recording stop, and saving of data acquisition logs and alarm summaries
- USER1: Write setting values file (default)
- USER2: Load setting file (default)

User function keys: Keys can be assigned arbitrarily by the user with the Event/Action function.

Key lock function: All keys can be enabled or disabled at once.

Dip switch 1: Operation upon power ON determined by dip switch settings.
All switches ON: Normal operation
Switch 5 (only) OFF: All settings initialized
Switch 8 (only) OFF: Fixed IP address (192.168.0.10)

Other Functions

Time

Time function: Time settings consist of date, time, and time zone.
Backup function included.
Year designation: Last two digits of Western calendar
80 to 99 (1980-1999), 00 to 35(2000-2035)

Internal time accuracy: ±100ppm

Daylight saving time: The time on the internal clock is updated on the specified month, week, weekday, and time.
- Summer: On the month, week, weekday, and hour set as Summer time, the time on the internal clock is moved one hour ahead.
- Winter: On the month, week, weekday, and hour set as Winter time, the time on the internal clock is moved one hour behind.

Unlike the internal clock, which is changed on the main unit, the dates of the measured and computed values are not adjusted.

Tag Strings

During recording: Tags can be added to measured values that are recorded and saved.

During displaying: You can select whether to display tags or channel numbers on all channels.

Tag string settings: Can be set channel by channel.

No. of characters: Up to 15

Log Information

- Data acquisition logs
  When recording is stopped, data acquisition logs saved on the main unit are all saved to the CF card.
  Maximum no. of saved logs:
  1021 (if this number exceeded, old files are overwritten by new ones)
  File name: RECORDLG.TXT
  Save location: During recording, in the DATAnnnn folder on the CF card
  When recording stopped, on the root folder of the CF card
- Alarm summaries
  When recording is stopped, alarm summaries saved on the main unit are all saved to the CF card.
  Maximum no. of saved summaries:
  256 (if this number exceeded, old files are overwritten by new ones)
  File name: ALARMLG.TXT
  Save location: During recording, in the DATAnnnn folder on the CF card
- Communication related log information can be saved in the main unit.
  Communication log, FTP client operation log, e-mail operation log, DHCP operation log. These can only be referenced through communication output, and when the power is cut, they are initialized and not saved.
  Maximum no. saved: Shown in the table below. If the number is exceeded, old logs are overwritten

Item	Maximum no. saved
Operation log	256
Error log	50
Message summary	50
Communication log	200
FTP client log	50
SNTP client log	50
SNTP client log	50
DHCP client log	50
FTP server log	50
HTTP server log	50
Modbus master log	50
Modbus client log	50
Computation status	1
Recording status	1

Maximum no. displayed

Item	Maximum no. displayed
Modbus client connection command	100
Modbus client connection status	10
Modbus master command	100
Modbus master connection status	247
Strain initial balance result	60

Event/Action Function

By linking the Event function and Action function, you can control the operations of the main unit.
Number of settings: 30

Event operation: Edge: Execute an operation once according to changes in events
Level: Continue operation as long as the condition continues.
MATH operation start, recording operation start, flag input enabled
The same start function cannot be set to edge start or multiple settings simultaneously. When setting the start operation to time up on the timer, match time, or user function key, then computation start/stop, recording start/stop, and flag input 0/1 repeat alternately.

Event function: Digital input information, alarm occurrence, relay output, internal timer time up, match time, user function key, recording start, and others.

Action function: Recording start/stop, activate trigger, computation start/stop/reset/clear, reset timer, alarm ACK, flag input, write message, read/write settings.
Read/write setting value file can be performed with user function key.

Execution sequence: Execute from Event/Action setting number 1.
The action that is performed is of the last event that is executed.

Internal Timer

No. of timers: 6

Types of timers: Two; Relative timer and Absolute timer

Relative time timer: Repeats time up every specified time interval.
Time interval can be set in 1-minute intervals.
Setting range is 00 days 00 hours 00 min. to 31 days 23 hours 59 minutes. If the setting of the relative timer is changed or in the event of a power failure, the timer is reset to 0 and starts again. If the clock is changed, the timer time is not adjusted.

Absolute time timer: Using the specified reference time as a standard, repeats the time up every specified time interval.
Reference time set in one-minute intervals in the range of 00 hours 00 min. to 23 hours 59 minutes.
Time intervals: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 min, 1, 2, 3, 4, 6, 8, 12, 24 h. When the power fails or the clock is changed and the timeup time is exceeded, the time up is not acknowledged.

Match Time

No. of match times: 3

Match time function: Time up occurs: every month on the specified day, every week on the specified time; or every day at the specified time.
The setting is set in 1-minute intervals. When the power fails or the clock is changed and the timeup time is exceeded, the time up is not acknowledged.

Initializing Settings

Two types of settings initialization are available.

Initialization of all settings:
Initializes all setting values and measured values on the main unit. You can perform initialization through communication commands or by resetting the dip switch positions and turning ON the unit. When initialized using communication commands, module recognition information is not initialized.

Initialization of all settings excluding communication parameters:
All settings and measured values except for communication parameters and module recognition information are initialized. Executed using communication commands.

Initialization of the CF Card

Formats the CF card.

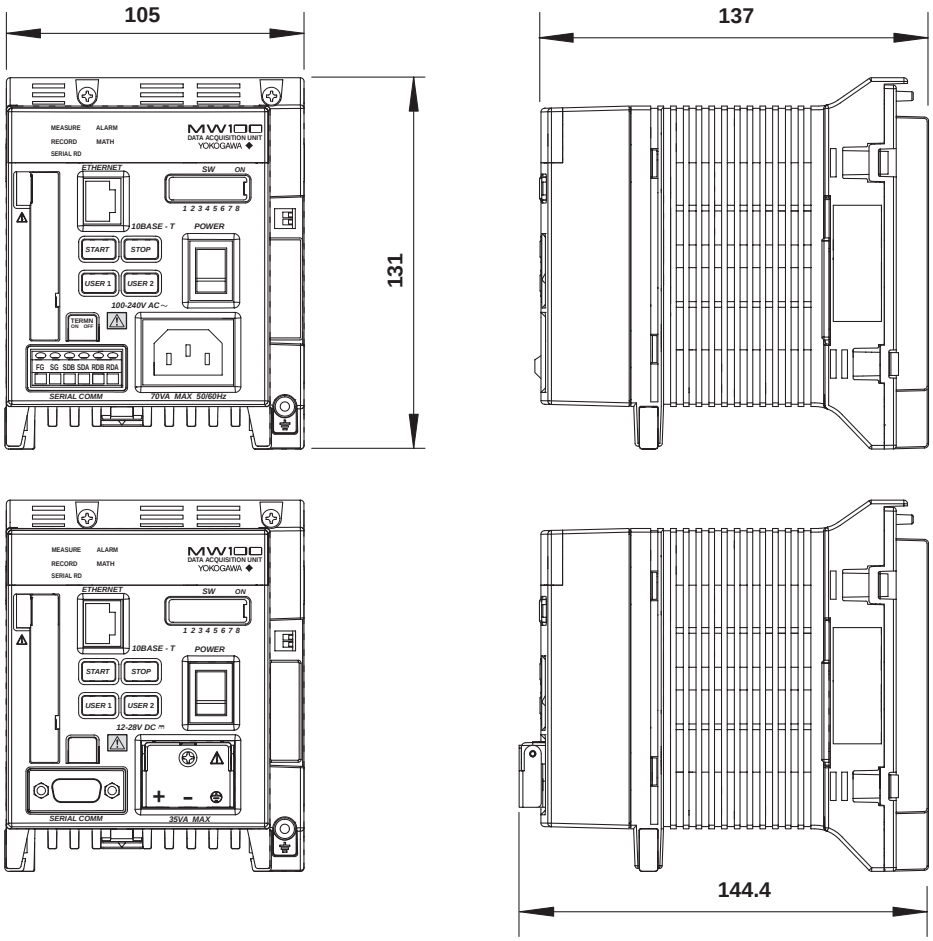
Format type:	Supports FAT16, logical format only
CF card size:	2 GB maximum

General Specifications

Operating temperature:	–20 to 60°C
Operating humidity:	20 to 80% RH for –20 to 40 °C 10 to 50% RH for 40 to 50 °C 5 to 30% RH for 50 to 60 °C
Power consumption:	Approx. 8 W
Insulation resistance:	Between power supply terminal and earth terminal: 20 MΩ or more (500 VDC)
Withstand Voltage	AC power Between AC power supply terminal and earth terminal: 1500 VAC (50/60 Hz) for one minute DC power Between DC power supply terminal and earth terminal: 1000 VAC (50/60 Hz) for one minute
External dimensions:	Approx. 105 (W) × 131 (H) × 137 (D) mm
Weight:	Approx. 1kg.

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.3 Base Plate Specifications

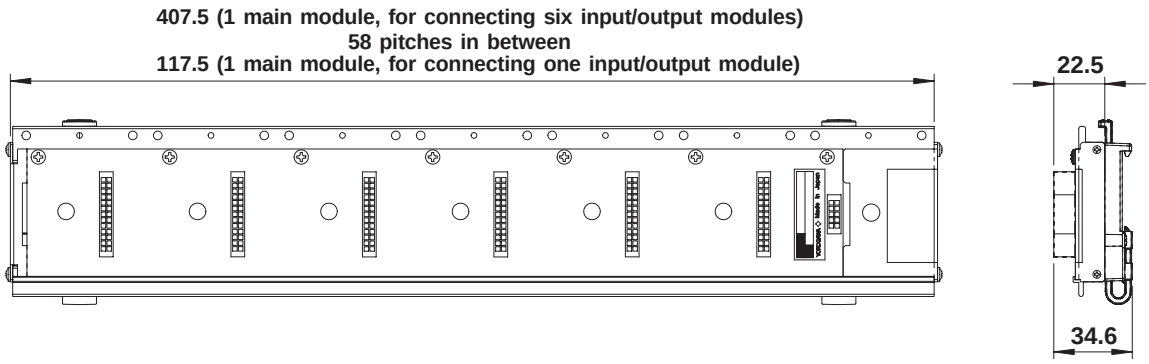
Number of main modules that can be attached:
1 (always attached)
Number of input/output modules that can be attached:
1 to 6 (specified by the suffix code)

External dimensions:	Approx. 118 to 408 (W) × 75 (H) × 35 (D) mm
Weight:	Approx. 0.37 kg (1 main module, for connecting six input/output modules)

External Dimensions

Units: mm

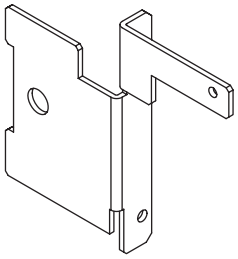
MX150-1, -2, -3, -4, -5, -6


407.5 (1 main module, for connecting six input/output modules)
58 pitches in between
117.5 (1 main module, for connecting one input/output module)
22.5
34.6

If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Attaching the MW100 Main Module

The accessory bracket must be attached in order to attach the MW100 main module to the base plate. For information about attaching the bracket, see the Installation and Connection Guide (IM MW100-72E).



5.4 4-CH, High-Speed Universal Input Module Specifications

Style number: S1
Type of measurement: DC voltage, thermocouple, 3-wire RTD, DI (contact, LEVEL)
Number of inputs: 4
Input method: Floating unbalanced input, insulation between channels
A/D resolution: 16 bits (±20000/±6000)
Measuring range and accuracy:

The accuracy applies to standard operating conditions: Ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 1.67 ms	Highest Resolution (1 Digit)
DC voltage	20 mV	–20.000 to 20.000 mV	±(0.05% of rdg + 5 digits)	±(0.1% of rdg + 25digits)	1 ∝V
	60 mV	–60.00 to 60.00 mV	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10digits)	10 ∝V
	200 mV	–200.00 to 200.00 mV	±(0.05% of rdg + 2 digits)		10 ∝V
	2 V	–2.0000 to 2.0000 V	±(0.05% of rdg + 5 digits)		100 ∝V
	6 V	–6.000 to 6.000 V	±(0.05% of rdg + 2 digits)		1 mV
	20 V	–20.000 to 20.000 V	±(0.05% of rdg + 2 digits)		1 mV
	100 V	–100.00 to 100.00 V	±(0.05% of rdg + 2 digits)		10 mV
	60mV (high res.)	0.000 to 60.000 mV	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	1∝V
	1V	–1.0000 to 1.0000 V	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10 digits)	100∝V
	6V (high res.)	0.0000 to 6.0000 V	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	100∝V
Thermocouple (excludes RJC accuracy, when burnout is OFF)	R[1]	0.0 to 1760.0°C	±(0.05% of rdg + 1°C) Except 0 to 100°C: ±3.7°C, 100 to 300°C: ±1.5°C for R and S; 400 to 600°C: ±2°C, less than 400°C: not guaranteed for B	±(0.1% of rdg + 4°C) Except 0 to 100°C: ±10°C, 100 to 300°C: ±5°C for R and S; 400 to 600°C: ±7°C, less than 400°C: not guaranteed for B	0.1°C
	S[1]				
	B[1]	0.0 to 1820.0°C			
	K[1]	–200.0 to 1370.0°C	±(0.05% of rdg + 0.7°C) Except –200°C to –100°C: ±(0.05% of rdg + 1°C)	±(0.1% of rdg + 3.5°C) Except –200°C to –100°C: ±(0.1% of rdg + 6°C)	
	E[1]	–200.0 to 800.0°C	±(0.05% of rdg + 0.5°C) Except –200°C to –100°C: ±(0.05% of rdg + 0.7°C) for J and L	±(0.1% of rdg + 2.5°C) Except –200°C to –100°C: ±(0.1% of rdg + 5°C) for J and L	
	J[1]	–200.0 to 1100.0°C			
	T[1]	–200.0 to 400.0°C			
	L[2]	–200.0 to 900.0°C			
	U	–200.0 to 400.0°C			
	N[3]	0.0 to 1300.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 3.5°C)	
	W[4]	0.0 to 2315.0°C	±(0.05% of rdg + 1°C)	±(0.1% of rdg + 7°C)	
	KPvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg + 0.7K)	±(0.1% of rdg + 3.5K)	0.1K
	PR40-20	0.0 to 1900.0°C	±(0.05% of rdg + 2.5°C) Except 300 to 700°C: ±6°C, less than 300°C: not guaranteed	±(0.1% of rdg + 12°C) Except 300 to 700°C: ±25°C, less than 300°C: not guaranteed	0.1°C
	NiNiMo	0.0 to 1310.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 2.7°C)	
	WRe3-25	0.0 to 2400.0°C	±(0.05% of rdg + 2°C) Except 0 to 200°C: ±2.5°C, more than 2000°C: ±(0.05% of rdg + 4°C)	±(0.1% of rdg + 7°C) Except 0 to 200°C: ±12°C, more than 2000°C: ±(0.1% of rdg + 11°C)	
	W/WRe26	0.0 to 2400.0°C	±(0.05% of rdg + 2°C) Except 100 to 300°C: ±4°C, less than 100°C: not guaranteed	±(0.1% of rdg + 8.5°C) Except 100 to 300°C: ±12°C, less than 100°C: not guaranteed	
	Type-N(AWG14)	0.0 to 1300.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 3.5°C)	
	TXK GOST	–200.0 to 600.0°C	±(0.05% of rdg + 0.5°C) Except –200 to 0°C: ±(0.2% of rdg + 0.7°C)	±(0.1% of rdg + 2.5°C) Except –200 to 0°C: ±(1% of rdg + 2.5°C)	

1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
2 L: Fe-CuNi, DIN43710/U: Cu-CuNi, DIN 43710
3 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
4 W: W•5%RE-W•26%Re (Hoskins Mfg Co)

5.4 4-CH, High-Speed Universal Input Module Specifications

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 1.67 ms	Highest Resolution (1 digit)
RTD (Measurement current: 1 mA)	Pt100[1]	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	JPt100[1]	–200.0 to 550.0°C			
	Pt100 (high res.)	–140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.01°C
	JPt100 (high res.)	–140.00 to 150.00°C			
	Ni100 SAMA[2]	–200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Ni100 DIN[2]	–60.0 to 180.0°C			
	Ni120[3]	–70.0 to 200.0°C			
	Pt100 (high noise resistance)	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 2.5°C)	0.1°C
	JPt100 (high noise resistance)	–200.0 to 550.0°C			
	Pt100 GOST	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.05% of rdg + 0.3°C)	0.1°C
RTD (Measurement current: 2 mA)	Pt100[1]	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	JPt100[1]	–200.0 to 550.0°C			
	Pt100 (high res.)	–140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.01°C
	JPt100 (high res.)	–140.00 to 150.00°C			
	Pt50[1]	–200.0 to 550.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu10 GE[4]	–200.0 to 300.0°C	±(0.1% of rdg + 0.7°C)	±(0.2% of rdg + 2.5°C)	
	Cu10 L&N[4]	–200.0 to 300.0°C			
	Cu10 WEED[4]	–200.0 to 300.0°C			
	Cu10 BAILEY[4]	–200.0 to 300.0°C			
	J263B	0.0 to 300.0K	±(0.05% of rdg + 0.3K)	±(0.1% of rdg + 1.5K)	0.1K
	Cu10 at 20°C alpha=0.00392	–200.0 to 300.0°C	±(0.1% of rdg + 0.7°C)	±(0.2% of rdg + 2.5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	–200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	–200.0 to 300.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	–50.0 to 150.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	–50.0 to 150.0°C			
	Pt25(JPt100/4)	–200.0 to 550.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu10 GE (high resolution)	–200.0 to 300.0°C	±(0.1% of rdg + 0.7°C)	±(0.2% of rdg + 2.5°C)	0.1°C
	Cu10 L&N (high resolution)	–200.0 to 300.0°C			
	Cu10 WEED (high resolution)	–200.0 to 300.0°C			
	Cu10 BAILEY (high resolution)	–200.0 to 300.0°C			
	Pt100 (high noise resistance)	–200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	JPt100 (high noise resistance)	–200.0 to 250.0°C			
	Cu100 GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu50 GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu10 GOST	–200.0 to 200.0°C	±(0.1% of rdg + 0.7°C)	±(0.2% of rdg + 0.5°C)	0.1°C
DI	Level	Vth = 2.4 V	Threshold level accuracy: ±0.1 V		
	Contact input	ON for 100 Ω or less, OFF for 10 kΩ or more[5]			

1 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/
JPt100: JIS C 1604-1981, JIS C 1606-1989
2 SAMA/DIN
3 McGRAW EDISON COMPANY
4 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu10 L&N: –75.0 to 150.0°C/Cu10 WEED: –20.0 to 250.0°C/
Cu10 BAILEY: –20.0 to 250.0°C
5 Measured using a measurement current of approximately 10 µA at 200 mV range. Threshold level is approximately 0.1 V.

Measurement interval, integration time, and filter:

Measurement Interval	Integration Time	Filter	Rejected Noise and Notes
10 ms	1.67 ms*	Rectangular	600 Hz and its integer multiples
50 ms	16.67 ms		60 Hz and its integer multiples
	20 ms		50 Hz and its integer multiples
	Auto**		Automatically detects the power supply frequency and set 16.67 or 20 ms
100 ms	36.67 ms	Trapezoidal	50 Hz or 60 Hz and their integer multiples
200 ms			
500 ms	100 ms	Rectangular	10 Hz and its integer multiples
1 s	200 ms	Cos	Fc = 5-Hz low-pass filter
2, 5,10, 20, 30, 60 s			

* When the measurement interval is 10 ms, measured values may fluctuate since power supply frequency noise is not rejected. In such cases, set the measurement interval to 50 ms or more.
** For DC power, set to 20 ms.

Reference junction compensation:

Switch external/internal by channel, includes remote RJC function

Reference junction compensation accuracy:
When measuring temperature greater than or equal to 0°C and when the temperature of the input terminal is balanced
Type R, S, W: ±1°C
Type K, J, E, T, N, L, U, TXK: ±0.5°C
Type N(AWG14), PLATINEL, NiNiMo, WRe3-25, W/WRe26: ±1°C
Note: The internal reference junction compensation is fixed to 0°C for type B and PR40-20

Maximum input voltage: DC voltage at 1-V range or less, TC, RTC, and DI (contact): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)

Normal mode voltage: DC voltage, TC, DI (LEVEL): 1.2 times the range rating or less (50/60 Hz, peak value including the signal component)
RTD 100 Ω: 50 mVpeak
RTD 10 Ω, 25 Ω, 50 Ω: 10 mVpeak

Normal mode rejection ratio: For integration time of 16.67 ms or more: 40 dB or more (50/60 Hz ± 0.1%)
For integration time of 1.67 ms: 50/60 Hz is not rejected
The RTD and resistance ranges indicates the voltage conversion value when current flows.

Common-mode voltage: 600 VACrms (50/60 Hz), reinforced (double) insulation

Common mode rejection ratio (50/60 Hz ±0.1%, 500 Ω unbalanced between minus measurement terminal and ground)
The RTD and resistance ranges indicates the voltage conversion value when current flows.
When the integration time is 16.67 ms or more: 120 dB or more
When the integration time is 1.67 ms or more: 80 dB or more

Common-mode voltage between channels:
250 VACrms (50/60 Hz), reinforced (double) insulation

Noise rejection: Rejection by the integrating A/D converter and the use of low pass filters

Input resistance: For DC voltage 1 V range or less and thermocouple range: 10 MΩ or less
For DC voltage 2 V range or higher: Approx. 1 MΩ
While measurement stopped: Approx. 1 MΩ

Insulation resistance: Between input terminal and earth terminal: 20 MΩ or more (500 VDC)

Input bias current: 10 nA or less (except for burnout setting)

Withstand voltage: 2300 VAC (50/60 Hz) for one minute between input terminals
3700 VAC (50/60 Hz) for one minute between the input terminal and earth terminal

Input signal source resistance: DC voltage, thermocouple: 2 kΩ or less
RTD 50 Ω, 100 Ω types: 10 Ω per line or less
RTD10 Ω, 25 Ω types: 1 Ω per line or less

Thermocouple burnout: Superposed electric current system, detection within the thermocouple range (detection ON/OFF possible)
Up/Down setting is possible, current approximately 100 nA
2 kΩ or less normal, 10 MΩ or more disconnected
Effect on measurement accuracy: ±15μV or less (not including effect of signal source resistance)

Parallel capacity during RTD: 0.01μF or less

Power consumption: Approx. 3 W

External dimensions: Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)

Weight: Approx. 0.5 kg.

Terminal type: Clamp, detachable per channel

Applicable wire size: 0.2 to 2.5 mm^2 (AWG24 to 12)

Effects of Operating Conditions

The specifications below apply when the integration time is 16.67 ms or more.

Warm-up time: At least 30 minutes after power-up

Effects of ambient temperature:

The effect received by changes in 10°C increments of the ambient temperature is
±(0.05% of rdg. + 0.05% of range) or less
However, for Cu10 Ω: ±(0.2% of range + 1 digit)

Effects of power fluctuation:

Meets the accuracy specifications for AC power supply in the range 90 to 132 V and 180 to 250 V

Effects of magnetic field: The fluctuation in external magnetic fields for AC (50/60 Hz) 400 A/m is
±(0.1% of rdg. + 10 digits) or less

Effects from the signal source resistance:

Effect from fluctuation in DC voltage and thermocouple signal source resistance of 1 kΩ

DC voltage: 1 V range or less ±10 μV or less
2 V range or higher ±0.15% of rdg. or less

Thermocouple: ±10 μV or less
However, when burnout is set, ±150 μV or less

RTD: Fluctuation per 10 Ω change per line (3 lines all same resistance) for 100Ω types: ±0.1°C or less; other than 100 Ω types: ±1.0°C or less; fluctuation resulting from difference in resistance between lead wires of 40 mΩ (max. difference among three wires): approximately 0.1 °C (for Pt100)

Effect of position: Horizontal with the feet at the bottom is the rule.

Effects of vibration: The fluctuation that results by applying a sinusoidal vibration along all three axes at a frequency between 10 to 60 Hz and an acceleration of 0.2 m/s^2 is ±(0.1% of rdg. + 1 digit) or less

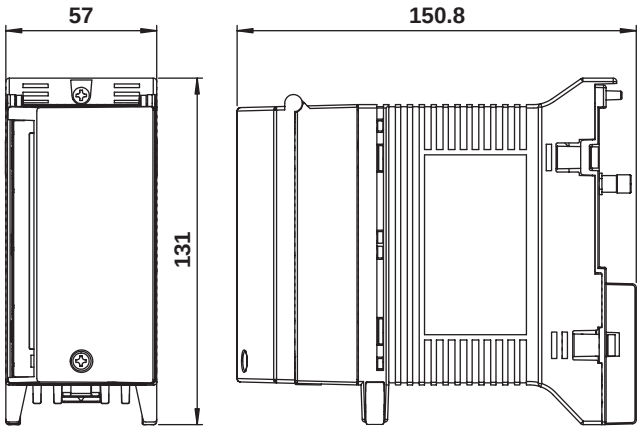
General Specifications

Operating temperature range: –20 to 60°C

Operating humidity range: 20 to 80% RH for –20 to 40 °C
10 to 50% RH for 40 to 50°C
5 to 30% RH for 50 to 60 °C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.5 10-CH, Medium-Speed Universal Input Module Specifications

Style number: S1
Type of measurement: DC voltage, thermocouple, 3-wire RTD, DI (contact, LEVEL)
Number of inputs: 10
Input method: Floating unbalanced input, insulation between channels (b terminal common for RTD)
A/D resolution: 16 bits (±20000/±6000)
Measuring range and accuracy:
The accuracy applies to standard operating conditions: Ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 16.67 ms	Highest Resolution (1 digit)
DC voltage	20 mV	–20.000 to 20.000 mV	±(0.05% of rdg + 5 digits)	±(0.1% of rdg + 25digits)	1 ∝V
	60 mV	–60.00 to 60.00 mV	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10digits)	10 ∝V
	200 mV	–200.00 to 200.00 mV	±(0.05% of rdg + 2 digits)		10 ∝V
	2 V	–2.0000 to 2.0000 V	±(0.05% of rdg + 5 digits)		100 ∝V
	6 V	–6.000 to 6.000 V	±(0.05% of rdg + 2 digits)		1 mV
	20 V	–20.000 to 20.000 V	±(0.05% of rdg + 2 digits)		1 mV
	100 V	–100.00 to 100.00 V	±(0.05% of rdg + 2 digits)		10 mV
	60mV (high res.)	0.000 to 60.000 mV	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	1∝V
	1V	–1.0000 to 1.0000 V	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10 digits)	100∝V
	6V (high res.)	0.0000 to 6.0000 V	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	100∝V
Thermocouple (excludes RJC accuracy)	R[1]	0.0 to 1760.0°C	±(0.05% of rdg + 1°C) Except 0 to 100°C: ±3.7°C, 100 to 300°C: ±1.5°C for R and S; 400 to 600°C: ±2°C, less than 400°C: not guaranteed for B	±(0.1% of rdg + 4°C) Except 0 to 100°C: ±10°C, 100 to 300°C: ±5°C for R and S; 400 to 600°C: ±7°C, less than 400°C: not guaranteed for B	0.1°C
	S[1]				
	B[1]	0.0 to 1820.0°C			
	K[1]	–200.0 to 1370.0°C	±(0.05% of rdg + 0.7°C) Except –200°C to –100°C: ±(0.05% of rdg + 1°C)	±(0.1% of rdg + 3.5°C) Except –200°C to –100°C: ±(0.1% of rdg + 6°C)	
	E[1]	–200.0 to 800.0°C	±(0.05% of rdg + 0.5°C) Except –200°C to –100°C: ±(0.05% of rdg + 0.7°C) for J and L	±(0.1% of rdg + 2.5°C) Except –200°C to –100°C: ±(0.1% of rdg + 5°C) for J and L	
	J[1]	–200.0 to 1100.0°C			
	T[1]	–200.0 to 400.0°C			
	L[2]	–200.0 to 900.0°C			
	U	–200.0 to 400.0°C			
	N[3]	0.0 to 1300.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 3.5°C)	
	W[4]	0.0 to 2315.0°C	±(0.05% of rdg + 1°C)	±(0.1% of rdg + 7°C)	
	KPvsAu7Fe	0.0 to 300.0K	±(0.05% of rdg + 0.7K)	±(0.1% of rdg + 3.5K)	0.1K
	PR40-20	0.0 to 1900.0°C	±(0.05% of rdg + 2.5°C) Except 300 to 700°C: ±6°C, less than 300°C: not guaranteed	±(0.1% of rdg + 12°C) Except 300 to 700°C: ±25°C, less than 300°C: not guaranteed	0.1°C
	NiNiMo	0.0 to1310.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 2.7°C)	
	WRe3-25	0.0 to 2400.0°C	±(0.05% of rdg + 2°C) Except 0 to 200°C: ±2.5°C, more than 2000°C: ±(0.05% of rdg + 4°C)	±(0.1% of rdg + 7°C) Except 0 to 200°C: ±12°C, more than 2000°C: ±(0.1% of rdg + 11°C)	
	W/WRe26	0.0 to 2400.0°C	±(0.05% of rdg + 2°C) Except 100 to 300°C: ±4°C, less than 100°C: not guaranteed	±(0.1% of rdg + 8.5°C) Except 100 to 300°C: ±12°C, less than 100°C: not guaranteed	
	Type-N(AWG14)	0.0 to 1300.0°C	±(0.05% of rdg + 0.7°C)	±(0.1% of rdg + 3.5°C)	
	TXK GOST	–200.0 to 600.0°C	±(0.05% of rdg + 0.5°C) Except –200 to 0°C: ±(0.2% of rdg + 0.7°C)	±(0.1% of rdg + 2.5°C) Except –200 to 0°C: ±(1% of rdg + 2.5°C)	

1 R, S, B, K, E, J, T: ANSI, IEC 584, DIN IEC 584, JIS C 1602-1981
2 L: Fe-CuNi, DIN43710/U: Cu-CuNi, DIN 43710
3 N: Nicrosil-Nisil, IEC 584, DIN IEC 584
4 W: W•5%RE-W•26%Re (Hoskins Mfg Co)

5.5 10-CH, Medium-Speed Universal Input Module Specifications

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 1.67 ms	Highest Resolution (1 Digit)
RTD (Measurement current: 1 mA)	Pt100[1]	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	JPt100[1]	–200.0 to 550.0°C			
	Pt100 (high res.)	–140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.01°C
	JPt100 (high res.)	–140.00 to 150.00°C			
	Ni100 SAMA[2]	–200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Ni100 DIN[2]	–60.0 to 180.0°C			
	Ni120[3]	–70.0 to 200.0°C			
	Pt50	–200.0 to 550.0°C			
	Cu10 GE[4]	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 L&N[4]	–200.0 to 300.0°C			
	Cu10 WEED[4]	–200.0 to 300.0°C			
	Cu10 BAILEY[4]	–200.0 to 300.0°C			
	J263B	0.0 to 300.0K	±(0.05% of rdg + 0.3K)	±(0.1% of rdg + 1.5K)	0.1K
	Cu10 at 20°C alpha=0.00392	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	–200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	–200.0 to 300.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	–50.0 to 150.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	–50.0 to 150.0°C			
	Pt25(JPt100/4)	–200.0 to 550.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu10 GE (high resolution)	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 L&N (high resolution)	–200.0 to 300.0°C			
	Cu10 WEED (high resolution)	–200.0 to 300.0°C			
	Cu10 BAILEY (high resolution)	–200.0 to 300.0°C			
	PT100GOST	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu100GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu50GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu10GOST	–200.0 to 200.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
DI	Level	Vth = 2.4 V	Threshold level accuracy: ±0.1 V		
	Contact input		ON for 100 Ω or less, OFF for 10 kΩ or more[5]		

1 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/
JPt100: JIS C 1604-1981, JIS C 1606-1989

2 SAMA/DIN

3 McGRAW EDISON COMPANY

4 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu10 L&N: –75.0 to 150.0°C/Cu10 WEED: –20.0 to 250.0°C/
Cu10 BAILEY: –20.0 to 250.0°C

5 Measured using a measurement current of approximately 10 μA at 200 mV range. Threshold level is approximately 0.1 V.

Measurement interval, integration time, and filter:

Measurement Interval	Integration Time	Burnout Detection Cycle	Filter	Rejected Noise and Notes
100 ms	1.67 ms	1 s[1]	Rectangular	600 Hz and its integer multiples[2]
200 ms		Measurement interval		
500 ms	16.67 ms			60 Hz and its integer multiples
	20 ms			50 Hz and its integer multiples
	Auto[3]			Automatically detects the power supply frequency andset 16.67 or 20 ms
1 s	36.67 ms		Trapezoidal	50 Hz or 60 Hz and their integer multiples
2 s	100 ms[4]		Rectangular	10 Hz and its integer multiples
5 s	200 ms[5]		Cos	Fc = 5-Hz low-pass filter
10, 20, 30, 60 s	200 ms			

1 When the measurement interval is 100 ms, burnout is detected in one channel per measurement interval. Therefore, if measurement is started in a burnout condition or after a burnout occurs, burnout cannot be detected for up to 10 measurements (approximately 1 second).

2 Because the power supply frequency noise is not rejected, measured values may fluctuate particularly for temperature measurements using thermocouples. If this happens, make the measurement interval longer, or use the 4-CH High-Speed Universal Input Module.

3 For DC power, set to 20 ms.

4 When synchronizing time by SNTP, the integral time is set to 36.67 ms. Also in this case, noise of 50 Hz, 60 Hz, and their integer multiples is rejected.

5 When synchronizing time by SNTP, the integral time is set to 100 ms. Also in this case, noise of 10 Hz and its integer multiples is rejected.

Reference junction compensation:

Switch external/internal by channel, includes remote RJC function

Reference junction compensation accuracy:
When measuring temperature greater than or equal to 0 °C and when the temperature of the input terminal is balanced
Type R, S, W: ±1°C
Type K, J, E, T, N, L, U, TXK: ±0.5°C
Type N (AWG14), PLATINEL, NiNiMo, WRe3-25, W/WRe26: ±1°C
Note: Type B and PR40-20 internal RJC is fixed at 0°C

Maximum input voltage: DC voltage at 1-V range or less, TC, RTC, and DI (contact): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)

Normal-mode voltage: DC voltage, TC, DI (LEVEL): 1.2 times the range rating or less (50/60 Hz, peak value including the signal component)
RTD 100 Ω: 50 mVpeak
RTD 10 Ω, 25 Ω, 50 Ω: 10 mVpeak

Normal-mode rejection ratio:
For integration time of 16.67 ms or more: 40 dB or more (50/60 Hz ± 0.1%)
For integration time of 1.67 ms: 50/60 Hz is not rejected.
The RTD and resistance ranges indicate the voltage conversion value when current flows.

Common-mode voltage: 600 VACrms (50/60 Hz), reinforced (double) insulation

Common mode rejection ratio (50/60 Hz ±0.1%, 500 Ω unbalanced between minus measurement terminal and ground)
The RTD and resistance ranges indicate the voltage conversion value when current flows.
When the integration time is 16.67 ms or more: 120 dB or more
When the integration time is 1.67 ms: 80 dB or more

Common-mode voltage between channels: 120 VACrms (50/60 Hz)

Noise rejection: Rejection by the integrating A/D converter and the use of low pass filters

Input resistance: For DC voltage 1 V range or less and thermocouple range: 10 MΩ or less
For DC voltage 2 V range or higher: Approx. 1 MΩ

Insulation resistance: Between input and ground: 20 MΩ or more (500 VDC)

Input bias current: 10 nA or less (except for burnout setting)

Withstand Voltage: 1000 VAC (50/60 Hz) for one minute between input terminals
3700 VAC (50/60 Hz) for one minute between the input terminal and earth terminal

Input signal source resistance:
DC voltage, thermocouple: 2 kΩ or less
RTD 50 Ω, 100 Ω types: 10 Ω per line or less
RTD 10 Ω, 25 Ω types: 1 Ω per line or less

Thermocouple burnout: Detection at a specified detection interval per measurement interval and detection within the thermocouple range (detection ON/OFF possible)
Up/Down setting is possible
2 kΩ or less normal, 200 kΩ or more disconnected
(shunt capacitance: 0.01 μF or less), detection current approx. 10 μA, detection time approx. 2 ms

Parallel capacity during RTD: 0.01μF or less

Power consumption: Approx. 1.2 W

External dimensions: Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)

Weight: Approx. 0.5 kg.

Terminal type: Clamp, terminal board is detachable

Applicable wire size: 0.14 to 1.5 mm^2 (AWG26 to 16)

Effects of Operating Conditions

The specifications below apply when the integration time is 16.67 ms or more.

Warm-up time: At least 30 minutes after power-up

Effects of ambient temperature:

The effect received by changes in 10°C increments of the ambient temperature is
±(0.05% of rdg. + 0.05% of range) or less
However, for Cu10 Ω: ±(0.2% of range + 1 digit)

Effects of power fluctuation:

Meets the accuracy specifications for AC power supply in the range 90 to 132 V and 180 to 250 V

Effects of magnetic field: The fluctuation in external magnetic fields for AC (50/60 Hz) 400 A/m is ±(0.1% of rdg. + 10 digits) or less

Effects from the signal source resistance:

Effect from fluctuation in DC voltage and thermocouple signal source resistance of 1 kΩ

DC voltage:	1 V range or less	±10 μV or less
	2 V range or higher	±0.15% of rdg. or less

Thermocouple: ±10 μV or less

RTD: Fluctuation per 10 Ω change per line (3 lines all same resistance) for 100 Ω types: ±0.1°C or less; other than 100 Ω types: ±1.0°C or less; fluctuation resulting from difference in resistance between lead wires of 40 mΩ (max. difference among three wires): approximately 0.1 °C (for Pt100)

Effect of position: Horizontal with the feet at the bottom is the rule.

Effects of vibration: The fluctuation that results by applying a sinusoidal vibration along all three axes at a frequency between 10 to 60 Hz and an acceleration of 0.2 m/s^2 is ±(0.1% of rdg. + 1 digit) or less

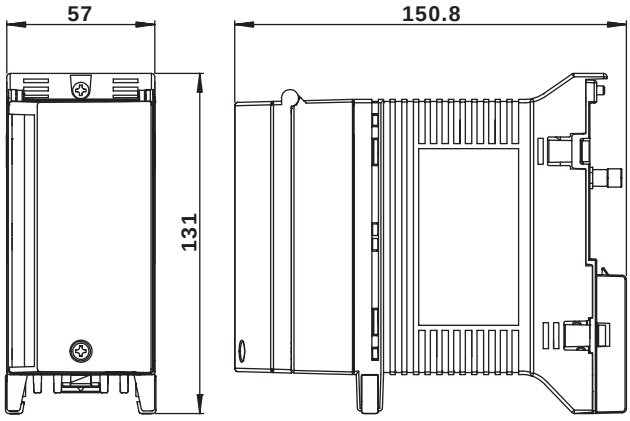
General Specifications

Operating temperature range: –20 to 60°C

Operating humidity range: 20 to 80% RH for –20 to 40 °C
10 to 50% RH for 40 to 50°C
5 to 30% RH for 50 to 60 °C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.6 6-CH, Medium-Speed Four-Wire RTD Resistance Input Module Specifications

Style number: S2
Type of measurement: DC voltage, 4-wire RTD, 4-wire resistance, DI (contact, LEVEL)
Number of inputs: 6
Input method: Floating unbalanced input, insulation between channels
A/D resolution: 16 bits (±20000/±6000)
Measuring range and accuracy:
The accuracy applies to standard operating conditions: Ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 1.67 ms	Highest Resolution (1 Digit)
DC voltage	20 mV	–20.000 to 20.000 mV	±(0.05% of rdg + 5 digits)	±(0.1% of rdg + 25digits)	1 ∝V
	60 mV	–60.00 to 60.00 mV	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10digits)	10 ∝V
	200 mV	–200.00 to 200.00 mV	±(0.05% of rdg + 2 digits)		10 ∝V
	2 V	–2.0000 to 2.0000 V	±(0.05% of rdg + 5 digits)		100 ∝V
	6 V	–6.000 to 6.000 V	±(0.05% of rdg + 2 digits)		1 mV
	20 V	–20.000 to 20.000 V	±(0.05% of rdg + 2 digits)		1 mV
	100 V	–100.00 to 100.00 V	±(0.05% of rdg + 2 digits)		10 mV
	60mV (high res.)	0.000 to 60.000 mV	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	1∝V
	1V	–1.0000 to 1.0000 V	±(0.05% of rdg + 2 digits)	±(0.1% of rdg + 10 digits)	100∝V
	6V (high res.)	0.0000 to 6.0000 V	±(0.05% of rdg + 20 digits)	±(0.1% of rdg + 100 digits)	100∝V
RTD[5] (Measurement current: 1 mA)	Pt100[1]	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	JPt100[1]	–200.0 to 550.0°C			
	Pt100 (high res.)	–140.00 to 150.00°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.01°C
	JPt100 (high res.)	–140.00 to 150.00°C			
	Ni100 SAMA[2]	–200.0 to 250.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Ni100 DIN[2]	–60.0 to 180.0°C			
	Ni120[3]	–70.0 to 200.0°C			
	Pt50	–200.0 to 550.0°C			
	Cu10 GE[4]	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 L&N[4]	–200.0 to 300.0°C			
	Cu10 WEED[4]	–200.0 to 300.0°C			
	Cu10 BAILEY[4]	–200.0 to 300.0°C			
	J263B	0.0 to 300.0K	±(0.05% of rdg + 0.3K)	±(0.1% of rdg + 1.5K)	0.1K
	Cu10 at 20°C alpha=0.00392	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 at 20°C alpha=0.00393	–200.0 to 300.0°C			
	Cu25 at 0°C alpha=0.00425	–200.0 to 300.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu53 at 0°C alpha=0.00426035	–50.0 to 150.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu100 at 0°C alpha=0.00425	–50.0 to 150.0°C			
	Pt25(JPt100/4)	–200.0 to 550.0°C	±(0.1% of rdg + 0.5°C)	±(0.2% of rdg + 2°C)	0.1°C
	Cu10 GE (high resolution)	–200.0 to 300.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C
	Cu10 L&N (high resolution)	–200.0 to 300.0°C			
	Cu10 WEED (high resolution)	–200.0 to 300.0°C			
	Cu10 BAILEY (high resolution)	–200.0 to 300.0°C			
	Pt100 GOST	–200.0 to 600.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu100 GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu50 GOST	–200.0 to 200.0°C	±(0.05% of rdg + 0.3°C)	±(0.1% of rdg + 1.5°C)	0.1°C
	Cu10 GOST	–200.0 to 200.0°C	±(0.1% of rdg + 2°C)	±(0.2% of rdg + 5°C)	0.1°C

1 Pt50: JIS C 1604-1981, JIS C 1606-1986/Pt100: JIS C 1604-1989, JIS C 1606-1989, IEC 751, DIN IEC 751/
JPt100: JIS C 1604-1981, JIS C 1606-1989
2 SAMA/DIN
3 McGRAW EDISON COMPANY
4 Guaranteed accuracy range Cu10 GE: –84.4 to 170.0°C/Cu10 L&N: –75.0 to 150.0°C/Cu10 WEED: –20.0 to 250.0°C/
Cu10 BAILEY: –20.0 to 250.0°C
5. 4-wire RTD, 4-wire resistance

Input	Measurement Range Type	Rated Measurement Range	Measurement Accuracy Integration Time: 16.67 ms or More	Measurement Accuracy Integration Time: 1.67 ms	Highest Resolution (1 Digit)
RTD[3] (Measurement current: 0.25 mA)	Pt500[2]	–200.0 to 600.0°C	±(0.05% of rdg + 3digits)	±(0.1% of rdg + 1.5digits)	0.1°C
	Pt1000[2]	–200.0 to 600.0°C			
Resistance	20 Ω (Measurement current 1 mA)	0.000 to 20.000 Ω	±(0.05% of rdg + 7digits)	±(0.1% of rdg + 25digits)	0.001Ω
	200 Ω (Measurement current 1 mA)	0.00 to 200.00 Ω	±(0.05% of rdg + 3digits)	±(0.1% of rdg + 15digits)	0.01Ω
	2 kΩ (Measurement current 0.25 mA)	0.0 to 2000.0 Ω	±(0.05% of rdg + 3digits)	±(0.1% of rdg + 10digits)	0.1Ω
DI	Level	Vth = 2.4 V	Threshold level accuracy: ±0.1 V		
	Contact input	ON for 100 Ω or less, OFF for 10 kΩ or more[1]			

1 Measured using a measurement current of approximately 10 μA at 200 mV range. Threshold level is approximately 0.1 V.
2 The Pt500 resistance table is Pt100 × 5, and the resistance table for Pt1000 is Pt100 × 10
3 4-wire RTD, 4-wire resistance.

Measurement interval, integration time, and filter:

Measurement Interval	Integration Time	Filter	Rejected Noise and Notes
100 ms	1.67 ms	Rectangular	600 Hz and its integer multiples[1]
200 ms			
500 ms	16.67 ms		60 Hz and its integer multiples
	20 ms		50 Hz and its integer multiples
	Auto[2]		Automatically detects the power supply frequency and set 16.67 or 20 ms
1 s	36.67 ms	Trapezoidal	50 Hz, 60 Hz and their integer multiples
2 s	100 ms[3]	Rectangular	10 Hz and its integer multiples
5 s	200 ms[4]	Cos	Fc = 5-Hz low-pass filter
10, 20, 30, 60 s	200 ms		

[1] When the measurement interval is 100 ms and 200 ms, measured values may fluctuate since power supply frequency noise is not rejected. In such cases, set the measurement interval to 500 ms or more.
[2] For DC power, set to 20 ms.
[3] When synchronizing time by SNTP, the integral time is set to 36.67 ms. Also in this case, noise of 50 Hz, 60 Hz, and their integer multiples is rejected.
[4] When synchronizing time by SNTP, the integral time is set to 100 ms. Also in this case, noise of 10 Hz and its integer multiples is rejected.

Maximum input voltage:

DC voltage at 1-V range or less, RTD, resistance, and DI (contact): ±10 VDC (continuous)
Other measurement ranges: ±120 VDC (continuous)

Normal-mode voltage

DC voltage, DI (LEVEL): 1.2 times the range rating or less (50/60 Hz, peak value including the signal component)
Resistance 2 kΩ, RTD 100 Ω, 500 Ω: 1000 Ω types: 50 mVpeak
Resistance 200 Ω, RTD 10 Ω, 25 Ω: 50 Ω types: 10 mVpeak
Resistance 20 Ω: 4 mVpeak

Normal-mode rejection ratio:

For integration time of 16.67 ms or more: 40 dB or more (50/60 Hz ± 0.1%)
For integration time of 1.67 ms: 50/60 Hz is not rejected

Common-mode voltage: 600 VACrms (50/60 Hz), reinforced (double) insulation

Common mode rejection ratio (50/60 Hz ±0.1%, 500 Ω unbalanced between minus measurement terminal and ground. The RTD and resistance ranges indicate the voltage conversion value when current flows)
When the integration time is 16.67 ms or more: 120 dB or more
When the integration time is 1.67 ms: 80 dB or more

Common-mode voltage between channels:

DC voltage, DI: 120 VACrms (50/60 Hz)
RTD, resistance: 50 VACrms (50/60 Hz)

Noise rejection: Rejection by the integrating A/D converter and the use of low pass filters
Input resistance: For DC voltage 1 V range or less: 10 MΩ or less
For DC voltage 2 V range or higher: Approx. 1 MΩ
Insulation resistance: Between input terminal and earth terminal: 20 MΩ or more (500 VDC)
Input bias current: 10 nA or less
Withstand voltage: 1000 VACrms (50/60 Hz) for one minute between input terminals (DC voltage and DI)
620 VACrms (50/60 Hz) for one minute between input terminals (RTD and resistance)
3700 VACrms (50/60 Hz) for one minute between the input terminal and earth terminal
Input signal source resistance:
DC voltage: 2 kΩ or less
Resistance and RTD ranges: 10 Ω or less per line (same for all ranges)
Shunt capacity: 0.01 μF or less (when using RTD and resistance ranges)
Power consumption: Approx. 1.2 W
External dimensions: Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Weight: Approx. 0.5kg.
Terminal type: Clamp, terminal board is detachable
Applicable wire size: 0.14 to 1.5 mm^2 (AWG26 to 16)

Effects of Operating Conditions

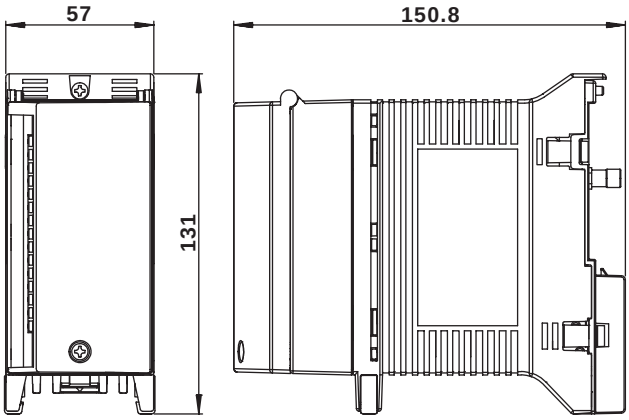
The specifications below apply when the integration time is 16.67 ms or more.
Warm-up time: At least 30 minutes after power-up
Effects of ambient temperature:
The effect received by changes in 10 degree increments of the ambient temperature is ±(0.05% of rdg. + 0.05% of range) or less. However, for Cu10 Ω: ±(0.2% of range + 1 digit)
Effects of power fluctuation:
Meets the accuracy specifications for AC power supply in the range 90 to 132 V and 180 to 250 V
Effects of magnetic field: The fluctuation in external magnetic fields for AC (50/60 Hz) 400 A/m is ±(0.1% of rdg. + 10 digits) or less
Effects from the signal source resistance: Effect from fluctuation in DC voltage signal source resistance of 1 kΩ
1 V range or less ±10 μV or less
2 V range or higher ±0.15% of rdg. or less
RTD: Fluctuation from 10 Ω change per line
1000 Ω, 100 Ω types: ± 0.1°C or less
Other than 1000 Ω, 100 Ω types: ± 1.0°C or less
Resistance: Fluctuation from 10 Ω change per line: ±1 digit or less
Effect of position: Horizontal with the feet at the bottom is the rule.
Effects of vibration: The fluctuation that results by applying a sinusoidal vibration along all three axes at a frequency between 10 to 60 Hz and an acceleration of 0.2 m/s^2 is ±(0.1% of rdg. + 1 digit) or less

General Specifications

Operating temperature range:	–20 to 60°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C
	10 to 50% RH for 40 to 50°C
	5 to 30% RH for 50 to 60 °C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.7 4-CH, Medium-Speed Strain Input Module Specifications

Style number: S2
Number of inputs: 4
Input type: Strain gauge or strain gauge type sensors (static strain)
Input method: Floating balanced input isolated between channels (NDIS is non-isolated)
Measurement range and accuracy:
The accuracy applies to standard operating conditions: Ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ± 1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.

One-Gauge Method Conversion

Input	Measurement Range Type	Rated Measurement Range	Integration time: 16.67 ms or more		Integration time: 1.67 ms or more	
			Measurement Accuracy	Resolution	Measurement Accuracy	Resolution
Strain	2000 ∝Strain	±2000.0 ∝Strain	±0.5% of range	0.1 ∝Strain	2% of range	1 ∝Strain*1
	20000 ∝Strain	±20000 ∝Strain	±0.3% of range	1 ∝Strain	1% of range	2 ∝Strain*2
	200000 ∝Strain	±200000 ∝Strain	±0.3% of range	10 ∝Strain	1% of range	10 ∝Strain

*1 Display resolution is 0.1 ∝Strain
*2 Display resolution is 1 ∝Strain

AD resolution: Equivalent to ± 20000 FS display
However, excludes 1.67 ms integration time

AD integration time:

Measurement Interval	Integration Time	Filter	Rejected Noise and Notes
100 ms	1.67 ms	Rectangular	600 Hz and its integer multiples[1]
200 ms	16.67 ms		60 Hz and its integer multiples
	20 ms		50 Hz and its integer multiples
	Auto[2]		Automatically detects the power supply frequency and set 16.67 or 20 ms
500 ms	36.67 ms	Trapezoidal	50 Hz, 60 Hz and their integer multiples
1 s	100 ms	Rectangular	10 Hz and its integer multiples
2 s	200 ms[3]	Cos	Fc = 5-Hz low-pass filter
5, 10, 20, 30, 60 s	200 ms		

[1] When the measurement interval is 100 ms, measured values may fluctuate since power supply frequency noise is not rejected. In such cases, set the measurement interval to 200 ms or more.
[2] For DC power, set to 20 ms.
[3] When synchronizing time by SNTP, the integral time is set to 100 ms. Also in this case, noise of 10 Hz and its integer multiples is rejected.

Gauge connection method:
1-gauge (2 or 3 wire systems), opposing 2 gauge, adjacent 2- or 4-gauge
With clamp terminals, set on a channel basis with switches
Applicable gauge resistance: 100 to 1000 Ω
120 Ω for -B12; 350 Ω, built-in resistance for -B35
Bridge voltage: Fixed at 2 VDC. Accuracy ±5% compensated with internal Cal
Applicable gauge factor:
Fixed at 2.0. Gauge factor can be compensated with the scaling function
Balance adjustment: Automatic, digital calculation methods
Balance adjustment range:
±10000 μstrain (1 gauge method conversion)
Balance adjustment accuracy:
The measurement accuracy or less
Resistance accuracy for bridge:
±0.01% ±5ppm/°C
Input resistance: 1 MΩ or more.

Allowable wiring resistance:
100 Ω or less
Effect of wiring resistance:
NDIS 50 ppm of rdg. / Ω (when using remote sensing wire)
Does not compensate for clamp wiring resistance. Depends on the gauge resistance.
Allowable input voltage:
±10 VDC (between H-L) continuous
Allowable common-mode voltage: Channel-to-channel: 30 VACrms
Between input and ground: 250 VACrms (-B12, -B35), 30 VACrms (-NDI)
However, NDIS connector shell is connected to earth potential.
Common-mode rejection ratio*:
When the integration time is 16.67 ms or more: 120 dB or more.
When the integration time is 1.67 ms: 80 dB or more
(voltage conversion value at 50/60 Hz ±0.1%, bridge voltage of 2 V)
Normal mode rejection ratio:
For integral time of 16.67 ms or more: 40 dB or more (50/60 Hz ± 0.1%)
For integral time of 1.67: 50/60 Hz is not rejected.
(voltage conversion value given a bridge voltage of 2 V)
Insulation resistance*: Between input and earth 20 MΩ or more (500 VDC)
Withstand voltage*: Between input and earth 2300 VAC for one minute
Channel-to-channel: 30 VACrms or less
Power consumption: Approx. 3 W (one module)
Weight: Approx. 0.5kg.
External dimensions: Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Terminal type: -B12, -B35: Clamp, terminal board is detachable
-NDI: NDIS, detachable by channel
Applicable wire size: 0.14 to 1.5 mm^2 (AWG26 to 16) (excluding -NDI)

* Does not apply to the NDIS terminal.

Effects of Operating Conditions

The specifications below apply when the integration time is 16.67 ms or more.
Warm-up time: At least 30 minutes after power-up
Effects of ambient temperature:
The effect received by changes in 10°C increments of the ambient temperature is
±(0.1% of range) or less
Effects of power fluctuation:
Meets the accuracy specifications for AC power supply in the range 90 to 132 V and 180 to 250 V
Effects of magnetic field:
The fluctuation in external magnetic fields for AC (50/60 Hz) 400 A/m is ±2% of range or less
Effect of position: Horizontal with the feet at the bottom is the rule.

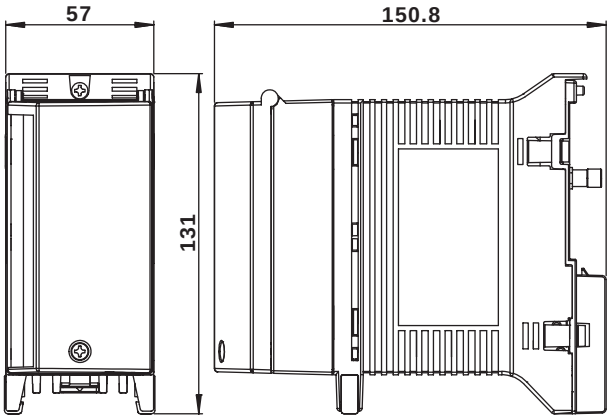
General Specifications

Operating temperature range:	–20 to 60°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C
	10 to 50% RH for 40 to 50 °C
	5 to 30% RH for 50 to 60 °C

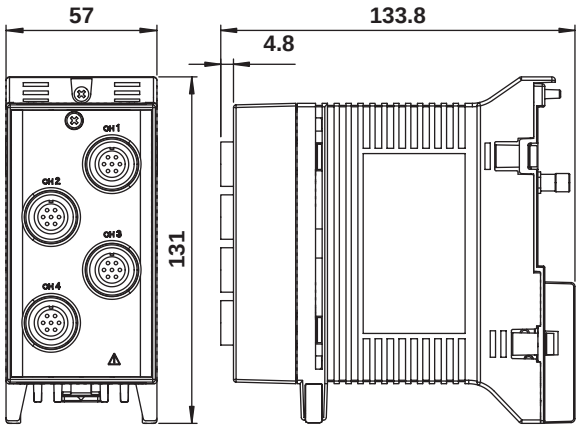
External Dimensions

Units: mm

-B12, -B35



-NDI



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.8 10-CH, High-Speed Digital Input Module Specifications

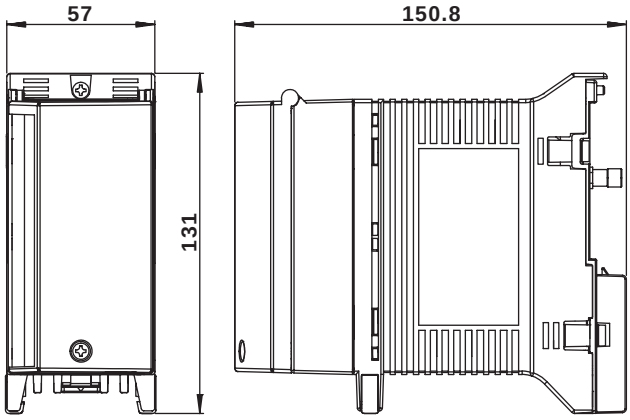
Style number:	S1(-D05), S2(-D24)
Input type:	-D05: Contact (non-voltage contact, open collector) and LEVEL (5-V logic) -D24: LEVEL (24-V logic)
Number of inputs:	10
Input format:	-D05: Pull up at approx. 5 V/approx. 5 kΩ, non-isolated between channels -D24: No isolation between channels
Measurement interval:	Select 10 ms, 50 ms, 100 ms, 200 ms, 500 ms, 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, or 60 s
Filter	Measurement interval of 5 s or less: Use the wider of the ON/OFF width of the detection period (approximately 75% to 90% of the measurement interval) Measurement interval of 5 s or more: Use the wider of the ON/OFF width of approximately 4.5 s
Minimum detection pulse width:	Twice the sampling interval or more
Input threshold level:	-D05: Contact (non-voltage contact, open collector): 100 Ω or less, ON, 100 kΩ or more, OFF LEVEL (5-V logic): OFF at 1 V or less and ON at 3 V or more -D24: LEVEL (24-V logic): OFF at 6 V or less and ON at 16 V or greater
Hysteresis width:	-D05: Approx. 0.1 V -D24: Approx. 1.5 V
Contact transistor rating:	15 VDC or greater and 30 mA or greater Transistor with a rating of Vce > 15 VDC and Ic > 30 mA
Maximum input voltage:	-D05: ±10 V -D24: ±50 V
Insulation resistance:	Between input terminals and ground: 20 MΩ or more (500 VDC)
Withstand Voltage	2300 VAC (50/60 Hz) for one minute between input and earth
Maximum common mode voltage:	250 VACrms (50/60 Hz)
Terminal type:	Clamp
Power consumption:	Approx. 1.5 W
Applicable wire size:	0.14 to 1.5 mm^2 (AWG26 to 16)
External dimensions:	Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Weight:	Approximately 0.5kg.

General Specifications

Operating temperature range:	–20 to 60°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C 10 to 50% RH for 40 to 50 °C 5 to 30% RH for 50 to 60 °C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

5.9 8-CH, Medium-Speed Analog Output Module Specifications

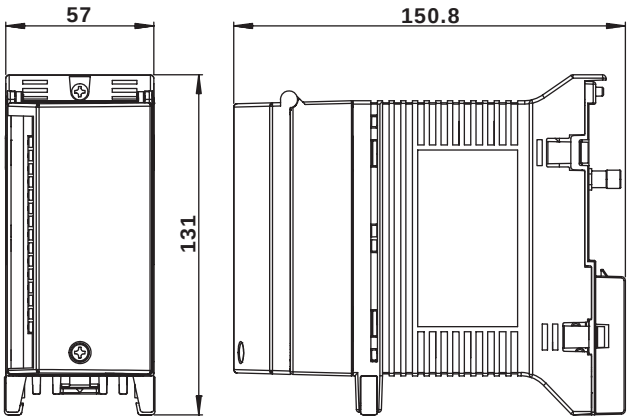
Style number:	S2
Number of outputs:	8
Update interval:	100 ms minimum (not synchronized to the measurement interval)
Output types:	DC voltage, DC current (external 24-V power supply required when using current output)
Rated output range:	Voltage: –10 to 10 V Current: 0 to 20 mA sourcing (for 1 to 5 V output, 4 to 20 mA is output)
Maximum allowable output range:	
	Voltage: –11 to 11 V Current: 0 to 22 mA
Load impedance:	Voltage: 5 kΩ or more Current: 600 Ω or less.
Accuracy:	±0.2% of F.S. at the rated output range or less (F.S. = 10 V or 20 mA). However, for current output, accuracy is met at 1 mA or more. The accuracy applies to standard operating conditions: Ambient temp: 23±2°C, ambient humidity: 55±10% RH, supply voltage: 90 to 250 VAC, power frequency: 50/60 Hz ±1%, warm-up time: at least 30 minutes, without adverse conditions such as vibrations.
Output resolution:	12 bits of F.S. or more Resolution –10.000 V to 10.000 V (1 mV resolution) 0.000 mA to 20.000 mA (1μA resolution)
Effects of ambient temperature:	
	±(50 ppm of Setting + 50 ppm of F.S.) per degree 1°C or less (F.S. = 10 V or 20 mA)
External power supply:	24 V ±10% (required when using current output) Connect a device with capacity of 250 mA or more.
Insulation resistance:	Between output terminals and earth terminal: 20 MΩ or more (500 VDC) Across output terminals: non-isolated (- terminal common potential)
Withstand voltage:	2300 VAC (50/60 Hz) for one minute between the output terminal and earth. Across output terminals: non-isolated (-terminal common potential).
Power consumption:	Approx. 2.5 W (not including power consumption of external power supply).
Terminal type:	Clamp, attached and removed in units of 4 channels
Applicable wire size:	0.08 to 2.5 mm^2 (AWG28 to 12)
External dimensions:	Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Weight:	Approx. 0.5 kg.

General Specifications

Operating temperature range:	–20 to 50°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C 10 to 50% RH for 40 to 50°C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Output Span Setting

Limit value of V mode and mA mode

Modes	Output lower limit*	Setting span lower limit	Setting span upper limit	Output upper limit **
V mode	–11[V]	–10[V]	+10[V]	+11[V]
mA mode	0[mA]	0[mA]	20[mA]	22[mA]

* –OVER, preset value
** + OVER, preset value

Handling Abnormal Data

Abnormal Data Types	Output value
Data upon startup	Preset value or previously held value can be selected
Data upon error occurrence	Preset value or previously held value can be selected
+OVER	5% of output Full Span
–OVER	–5% of output Full Span

±OVER conditions

- When the input channel is ±OVER in the case of transmission output
- When outside the range of voltage –11 V to +11 V, or current 0 mA to 22 mA (accuracy assured at 1 mA or more)

5.10 8-CH, Medium-Speed PWM Output Module Specifications

Style number: S2
Number of outputs: 8
Update interval: 100 ms minimum (not synchronized to the measurement interval)
Output interval: 1 ms to 300 s (can be set channel by channel)
However,
1 ms interval setting range: 1 ms to 30.000 s (can be set in units of 1 ms)
10 ms interval setting range: 10 ms to 300.00 s (can be set in units of 10 ms)
Output types: Pulse width:
Update timing: After receiving change command, duty is changed from falling of the next interval
Pulse interval accuracy: ±100ppm of Setting
External power supply: 4 to 28V
Insulation resistance: Between output terminals and earth terminal: 20 MΩ or more (500 VDC)
Across output terminals: non-isolated
Withstand voltage 2300 VAC (50/60 Hz) for one minute between the output terminal and earth
Across output terminals: non-isolated
Duty resolution: 1 ms interval setting range: 12000
10 ms interval setting range: 60000
Set at 0 to 100.000% (0.001% resolution)
Duty accuracy (at a load resistance 100 Ω or less):
For 1 ms interval setting range, ±0.017% or ±2μs whichever is longer
For 10 ms interval setting range, ±0.0035% or ±2μs whichever is longer
When the load resistance is greater than 100 Ω, the output duty can shift.
Output format: External power supply sourcing
ON resistance: 2 Ω or less, when output current is 200 mA or more.
Output capacity: 1A/ch max, however, 4 A or less total for all modules*, **

* A 1A current limit circuit is built in to the output circuit. Once the current limit circuit is ON, the circuit continues to operate unless the external power supply is turned OFF (maintains the output OFF status)
After turning OFF external power supplies, check the load, then start up the external power supply again.

** This module has a built-in fuse.
The built-in fuse protects against fires or abnormal emissions of heat due to load shortages or other abnormalities. It does not protect against damage to internal circuits.

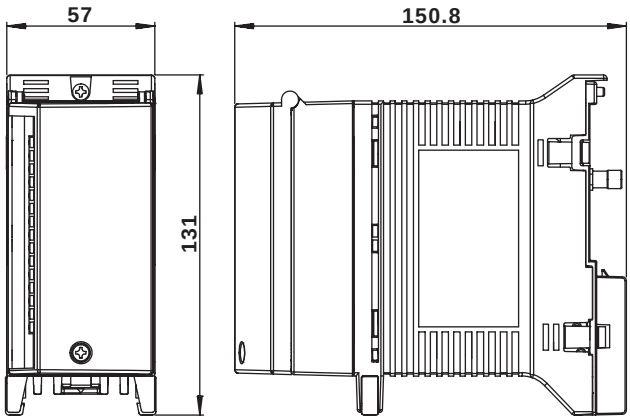
Power consumption: Approx. 2.5 W (not including power consumption of external power supply)
Terminal type: Clamp, attached and removed in units of 4 channels
Applicable wire size: 0.08 to 2.5 mm^2 (AWG28 to 12)
External dimensions: Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Weight: Approx. 0.5kg.

General Specifications

Operating temperature range:	–20 to 50°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C
	10 to 50% RH for 40 to 50°C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Handling Abnormal Data

Abnormal Data Types	Output value
Data upon startup	Preset value or previously held value can be selected
Data upon error occurrence	Preset value or previously held value can be selected
+OVER	Duty: +5% of the output Full Span
–OVER	Duty: –5% of the output Full Span

±OVER conditions

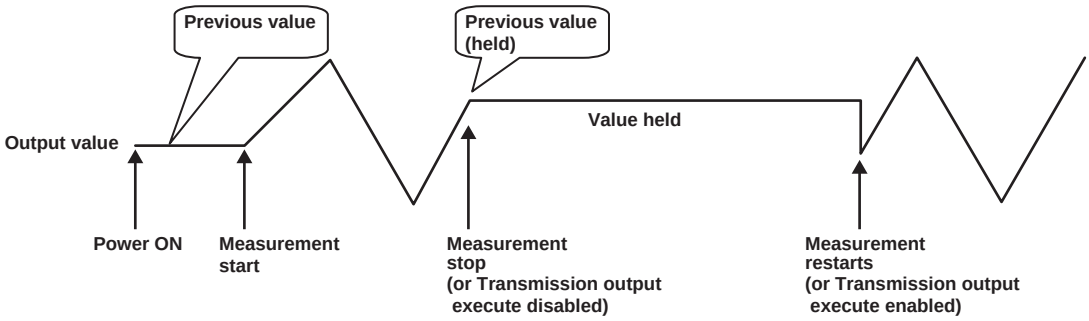
- When duty exceeds 0.000 to 100.000%
- When the input channel is ±OVER in the case of transmission output

5.11 Operations Common to the 8-CH Medium-Speed Analog Output Module and the 8-CH Medium Speed PWM Output Module

Settings Related Specifications (by Module)

Setting channel (Module)	Setting Contents			Settings	Remarks
Output Channel (AO, PWM)	Span Setting range	AO(V)	–10.000 to 10.000V	—	—
		AO(mA)	0.000 to -20.000 mA		
		PWM	0.000 to 100.000%		
	Preset value Setting range	AO(V)	–11.000 to 11.000V	—	Command output specification Max value also same as range on left
		AO(mA)	0.000 to 22.000 mA		
		PWM	0.000 to 100.000%		
	Setting span (minimum and maximum) specified in reverse			Yes	—
	Setting span (minimum, maximum) same value specification			No	—

Overview of Output Operation When Setting Holding of Previous Value of Transmission Output



5.12 10-CH, Medium-Speed Digital Output Module Specifications

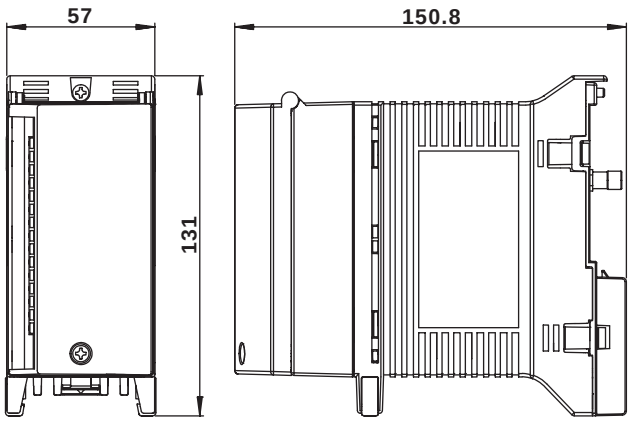
Style number:	S1
Number of outputs:	10
Contact mode:	A contact (SPST)
Update interval:	100 ms minimum (not synchronized to the measurement interval)
Contact capacity:	250 VDC/0.1 A, 250 VAC/2 A, or 30 VDC/2A (resistance load)
Contact life*:	100,000 times at rated load (typical) 20,000,000 times at no load (typical) * The contact life varies depending on the load conditions and the environment in which it is used.
Insulation resistance:	Between output terminals and earth terminal: 20 MΩ or more (500 VDC) Between output terminals: 20 MΩ or more (500 VDC)
Withstand Voltage	2300 VAC (50/60 Hz) for one minute between the output terminal and earth 2300 VAC (50/60 Hz) for one minute between output terminals
Maximum common-mode voltage:	250 VACrms (50/60 Hz)
Power consumption:	Approx. 2 W (when all relays are turned ON)
Terminal type:	Clamp, attached and removed in units of 5 channels
Applicable wire size:	0.08 to 2.5 mm^2 (AWG28 to 12)
External dimensions:	Approx. 57 (W) × 131 (H) × 151 (D) mm (including the terminal cover)
Weight:	Approx. 0.5kg.

General Specifications

Operating temperature range:	–20 to 50°C
Operating humidity range:	20 to 80% RH for –20 to 40 °C 10 to 50% RH for 40 to 50 °C

External Dimensions

Units: mm



If not specified, the tolerance is ±3%. However, in cases of less than 10 mm, the tolerance is ±0.3 mm.

Appendix 1 Supported Characters

When entering characters on the MW100 from a browser, the following characters can be used. There are limits to which characters can be used depending on the type of entry item. For information on the characters can that can be used in communication commands, see the MW100 Communication Command manual (IM MW100-17E).

Upper 4 bits

Lower 4 bits	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0			SP	0	@	P		p								
1			!	1	A	Q	a	q								
2				2	B	R	b	r								
3			#	3	C	S	c	s								
4				4	D	T	d	t								
5			%	5	E	U	e	u								
6			&	6	F	V	f	v								
7				7	G	W	g	w								
8			(	8	H	X	h	x								
9			)	9	I	Y	i	y								
A			□		J	Z	j	z								
B			+		K	[	k	{								
C				<	L		l	|							
D			-	=	M	]	m	}								
E			.	>	N	^	n	~								
F			/		O	_	o									

User Specified Strings

Alphanumeric English characters can be entered.

Passwords

Alphanumeric English characters can be entered. However, the following characters may not be used.

Space “blank”, and asterisk “ ∗”

Host Name, Domain Name, and Server Name

Alphanumeric English characters and hyphens “ -”, periods “ .”, and underscores “ _” can be used.

File Name

Alphanumeric English characters and “#”, “%”, “(”, “)”, “-”, “@”, and “_” can be used. However, the following character combinations may not be used.

“AUX”, “CON”, “PRN”, “NUL”, and “CLOCK”

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